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PROCEEDINGS OF THE VIRGIN ISLANDS PUBLIC MEETINGS ON THE NATIONAL ESTUARINE POLLUTION STUDY HELD ON APRIL 17, 1968 IN ST. DUNSTAN'S SCHOOL AUDITORIUM, CHRISTIANSTED, ST. CROIX, VIRGIN ISLANDS AND ON APRIL 19, 1968 AT THE SENATE BUILDING CHARLOTTE AMALIE, ST. THOMAS, VIRGIN ISLANDS

Federal Water Pollution Control Administration
Atlanta, Georgia

April 1968

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P R O C E E D I N G S

of the

VIRGIN ISLANDS PUBLIC MEETINGS

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NATIONAL ESTUARINE POLLUTION STUDY

FEDERAL WATER POLLUTION CONTROL ADMINISTRATION

April 17, 1968

St. Dunstan's School Auditorium

Christiansted, St. Croix, Virgin Islands

April 19, 1968

Senate Building

Charlotte Amalie, St. Thomas, Virgin Islands

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PUBLIC MEETING
NATIONAL ESTUARINE POLLUTION STUDY
Federal Water Pollution Control Administration

St. Dunstan's School Auditorium
Christiansted, Orange Grove

St. Croix,
Virgin Islands

April 17, 1968

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The public meeting directed toward obtaining contributions from Virgin Islands interests regarding the National Estuarine Pollution Study being conducted by the Federal Water Pollution Control Administration convened in the St. Dunstan's School Auditorium, Orange Grove, Christiansted, St. Croix, Virgin Islands, Wednesday morning, April 17, 1968, and was called to order at 9:25 by Mr. Paul Traina, Director of Technical Programs, Southeast Water Laboratory, Athens, Georgia.

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MR. PAUL TRAINA: Good morning. My name is Paul Traina, and I am with the Southeast Region of the Federal Water Pollution Control Administration, Athens, Georgia.

Today I am sitting in for Mr. John R. Thoman, who is the Regional Director, Southeast Region, for the FWPCA. Mr. Thoman personally regrets that he is unable to be here today. He had planned to be here, however Senator Muskie is conducting a hearing on thermal pollution in Miami this week.

I first want to welcome you all to this fourth public meeting to be held in the states and territories to gather information for the National Estuarine Pollution Study.

The first three meetings, all of which were held in the Southeast Region, have been held in Mississippi, Georgia and Florida. Next week we will be holding a meeting in Puerto Rico.

Of course, this meeting is going to be reconvened in St. Thomas Friday, April 19th, in the Senate Building. That will give a chance for the folks over there to express their views and for us to get their opinions on the subject.

The National Estuarine Pollution Study was called for in the Clean Water Restoration Act of 1966. In that Act, Congress directed the Department of the Interior to make an extensive study

of pollution problems in estuaries and to report to the Congress recommendations for a future management program.

This national study is to be completed and a report submitted to the Congress by November of 1969. As I say, we of the Southeast Region are the first to conduct public meetings to obtain the views and opinions of local, public, and private groups and individuals, and in the case of the Virgin Islands, of federal agencies and territorial agencies who have an interest in the Virgin Islands coastal waters.

Today we hope to hear from as many of these groups and agencies and individuals as possible. Most of you here were invited by letter to make a statement.

However, any of you who did not get such an invitation and would like to make a statement, we would be most happy to hear from you. All we ask is that you check in with Mrs. Brown in the back, and she will put you on the program.

Today we are pleased to have with us Dr. Roy Anduze, Commissioner of Health of the Virgin Islands. Dr. Anduze was asked by Governor Paiewonsky to represent the Islands' interest in this meeting.

To Dr. Anduze's right is Mr. Pedrito Francois, Director, Bureau of Environmental Sanitation with the Department of Health.

Before we begin, I would like to make one thing very clear. This is your meeting, not our meeting. We are here to listen and to learn. What you have to say is important to us, and it will become part of the report that will be sent to the Congress.

It will contribute to the development of national policy for estuarine management. The meeting record today, I might add, will be held open for 15 days to give any of you or anyone else a chance to submit statements that you would want to put into the record.

So we have an opening of 15 days that will allow you to put anything else you would like to enter into the record.

Mr. Tom Crites, on my left here, will make a verbatim account of our meeting today, and anyone who would like to make statements, please give your name and identification to Mr. Crites.

With that brief introduction, I would first like to call on Dr. Anduze for any comments that he might wish to make.

DR. ROY ANDUZE: I would like to say this, Mr. Traina, that Governor Paiewonsky is intensely interested in this problem of water pollution, air pollution, and sewage disposal; and during

th› last six months, he has spent considerable time and effort in trying to implement the workable program of water pollution, air pollution and sewage disposal.

I think that his ideas on this matter have been amply described in the local press and all the news media. I don't think that the governor would want me to spend too much time in describing his plans for the Virgin Islands this morning; so thank you, Mr. Traina.

MR. TRAINA: Thank you, Doctor.

With that, I would like to call on our first speaker who has indicated he would like to make a statement. This is Dr. Aubrey Anduze, who is the administrative assistant for St. Corix, representing the Office of the Governor. Dr. Anduze.

DR. AUBREY A. ANDUZE: Thank you, Mr. Chairman. Commissioner, members of the committee, ladies and gentlemen: My name is Aubrey A. Anduze, and I am the governor's administrative assistant for St. Croix.

The 50 islands and cays which make up the United States Virgin Islands have a tidal shore line of 140 miles. This length of shore line is larger than that of two Atlantic Coast states -- Pennsylvania and New Hampshire.

Much of the coast line is ringed with barrier reefs which give way to sheer cliffs or sweeping sandy beach catenarys. Mangrove trees in many areas mark the quiet waters of large and small lagoons.

Varying depths of water and types of bottom give breathtaking contrasts in color and form to the Virgin Islands coast line.

The barrier reefs and lagoons serve as spawning grounds and breeding grounds for marine life. The lagoons serve a dual purpose as the nesting ground for many different kinds of birds.

The ecology of the coast line is a delicately balanced cycle which cannot be broken at any point without severely affecting the interdependency upon which the tenuous cycle is bases.

The growth of the tourist industry can be attributed to many factors, but prominent among these are the scenic beauty, proximity and accessibility of the territory's coast line.

The specific tidal coast line -- the ratio of the state or territory's surface area to the length of its coast line -- is an index of the ease with which the permanent and transient residents of that region have access to coast line-centered activities.

A comparison of the states and territories included in the National Estuarine Pollution Study shows that the U. S. Virgin Islands has the lowest specific tidal coast line -- 0.97 miles.

Hawaii follows with six miles. The State of Pennsylvania has the higest figure -- 500 miles. The growth of tourism in the Virgin Islands is linked very closely to the type and quality of its coastal resources.

The demands of a growing population and the need for a diversified economy impose additional uses on the coastal resources of the territory. Uses which, in many instances, are harmful to the ecology of the coast line or uses, for that matter, which introduce large-scale changes in the makeup of the coast line.

The present system of using outfalls for raw sewage must be phased out and replaced with central sewage treatment systems. In addition to planning and constructing such sewage treatment systems, the insular government should initiate research programs into new sewage-disposal schemes; closed systems using vacuum removal, systems using solar energy to transform waste matter into ash or other systems which apply modern technology to the very old problem of waste removal.

The selection of sites for heavy industry and other catalysts of economic growth must be carefully weighed against the overall impact and irreversibility of the change in the ecology and scenic beauty of the coast line.

In the case of decisions already made and executed, it is the responsibility of the insular government to set up and police rigid air and water pollution controls.

The enactment of Chapter 7 of Title 12 (Water Pollution Control) last year is a step in the right direction; but the insular government must take the initiative in creating through research the kind of industries which are capable of creating jobs for a growing population without destroying the coastal resources.

In the past, of necessity, the insular government directed its energies toward attracting industries to this area. This was necessary and it has succeeded.

Concessions had to be made, as it were, to bait the hook. The loss of a portion of the territory's coast line to industrial use was balanced by a gain in the number of jobs and in the strength of the economy.

The direction taken from here, however, must be based on the initiative of the insular government's determination of multiple uses of the coastal resources weighed in the favor of conservation of the beauty and accessibility of the territory's coast line.

I thank you for the time you have granted me to present these remarks to you.

MR. TRAINA: We are trying to keep this informal. If there are any comments or questions from Dr. Anduze's paper, we would be most happy to hear them. If not, thank you, Dr. Anduze.

The next person we will hear from is Mr. Rudolph Shulterbrandt, representing the Department of Agriculture and Recreation, St. Croix.

MR. RUDOLPH SHULTERBRANDT: Mr. Chairman, Dr. Anduze, Commissioner Anduze, ladies and gentlemen: It's a pleasure to be here today to give a brief statement on the problem of estuarine and coastal pollution.

I am Rudolph Shulterbrandt, the Acting Commissioner of Agriculture and Recreation for the Virgin Islands. I am sorry I didn't receive your notice sooner, because we didn't have much time to get too deeply into this subject.

Any type of water or water problem is of great interest to the Department of Agriculture and Recreation, because we can surely say that water and water resources are the limiting factors in any kind of successful agricultural production.

So we are always concerned with any subject or any problems dealing with water. I would just like to make a few brief comments on the factors that may cause the major pollution problems typical to the Island of St. Croix.

I think we can say the source of this type pollution would come from two major areas. One would be from sewage, that is, raw sewage being dumped in the sea, and next we have some industrial pollution, which may have been derived from industrial development, such as dredging and construction operations at Harvey and Hess.

These have created a marine desert along a large part of our south coast line of St. Croix. And the raw sewage factor -- we have raw sewage being dumped into the sea. Then we always have aquifer pollution from septic fields, which is accelerated by: (1) increase in total sewage which is being put into the ground; (2) increase in number of wells and quantity of water being removed from the aquifer; (3) decrease in freshwater recharge of aquifer, due largely to the increased area being taken over by brush, housing, and roads.

From the industrial side, we also have residue from desalination plants, distillery effluence and waste from other industries, such as the abattoir.

We also have pollution problems which may be derived from the use of pesticides and insecticides; storm drains; and promiscuous clearing of potential development sites and road building, leaving large areas bare,

thereby causing erosion which, in turn, causes a silt problem along the coast during periods of heavy rains, and also new and expanding industries.

In the Department of Agriculture, we work very closely with the federal agencies in developing good water conservation practices, and anything we can do to reduce the pollution problems through this agency or any practices that we may require are gladly welcomed, and we are working very hard to augment these programs.

As I said, through the Soil Conservation Board and the Department, we hope to make a major contribution to this problem, and this is about all I can add to this meeting right now. Thank you very much.

MR. TRAINA: I have one question I would like to ask. You mentioned dredging. Is there much dredging on the Idland, other than what is required for industrial development, dredging for ports and harbors and beach erosion?

MR. SHULTERBRANDT: Well, in addition to the point you have mentioned, every once in a while, someone gets permission from the Department of Interior to do some dredging of sand.

You know, sand is becoming quite a scarce commodity as they increase the building development. I think every once in a while, some agency gets some permission from the Interior to do some dredging.

That is one of the basic factors that causes the increase in dredging. On the south coast of St. Croix, as I mentioned, there seems to be some kind of marine desert, some cause of residue from the Harvey development and the Hess development.

So I think that marine growth on the south coast of St. Croix is somewhat changing due to these two major factors -- two major industrial plants have been installed.

MR. TRAINA: Are there any other territorial agencies represented here? These are the only two I have.

How about any federal agencies? Are there any federal agencies that would wish to make a statement at this time?

If not, I would like to call on John Shultz of the Oxford Corporation. Is he here?

("He is not here" was heard from the floor.)

MR. TRAINA: Mr. Shultz had indicated he wanted to make a statement.

The next one on my list is Mr. Euan McFarlane, from the Fountain Valley Corporation.

MR. EUAN McFARLANE: Mr. Traina, Dr. Anduze and gentlemen: My name is Euan McFarlane. The opportunity to participate in this meeting is much appreciated, and our thanks to Governor Paiewonsky for including our name as one of the invitees.

The dedication of my principals to the problems of conservation and beautification is too well known to need more than passing emphasis and reiteration of their deep concern for the loss or potential loss of natural assets.

The letter of invitation lists the following headings for consideration in a statement such as this:

a. The role and relationship of federal, state, and local or regional agencies in the management of estuarine and coastal waters;

b. The value of such waters;

c. Damages envisioned through pollution of these waters;

d. Research needs;

e. Any other items appropriate.

We propose to follow this outline.

a. The role and ralationship of federal, state, and local or regional agencies in the management of estuaries and coastal waters.

If we consider these agencies in the reverse order and start from the bottom up, so to speak, at the local level we have the somewhat diverse and individual situations existing in each of the three islands: St. Croix, St. Thomas, and St. John.

It would, therefore, seem desirable that each island have its own local agency which, because of its special and detailed knowledge of its own resources and problems, should be in a position to take an inventory of its assets and make recommendations for their use.

These reports would be submitted to the commissioner of health, as the state-level agency for the Virgin Islands for assembly into an overall Virgin Islands plan.

It is recognized that there will be conflicts of interests in these local reports, and a spirit of cooperation and understanding of the need to attain the greatest good for the greatest number is most desirable.

Presumably, the Planning Board would play a vital part in the overall coordination and use determination. Once the overall Virgin Islands plan has been worked out, it is recommended that public hearings be held so that the plan may be expalined and, if necessary, the reasons given for decisions which may prove controversial.

This plan, when complete, should contain long-range budget estimates for the various projects recommended and, after approval by the appropriate governmental instrumentalities, should be forwarded to the federal agency having jurisdiction for incorporation into its grand master plans, both physical and financial.

Necessary legislation for the implementation of the program could then work back down from the federal to the local level.

b. The value of such waters. In an economy largely supported by tourism and with "crystal-clear waters" being universally advertised as one of the Virgin Islands' great assets, it is difficult to overemphasize the value of the surrounding waters, including harbors and areas such as Salt River.

The role of industry in broadening the economic base is recognized and appreciated, and it is suggested that modern technology, together with adequate planning and legislation, may well minimize the pollution problems attendant upon such industrial development.

c. Damages envisioned through pollution. Bird, animal, marine, and vegetable life are all casualties of pollution. The loss of swimming beaches, snorkeling areas, coral reefs, bases for charter boats, all would seriously affect a tourist-oriented economy.

The loss of fish as part of the Island's basic diet and as a sport-fishing attraction would have far-reaching economic impact.

d. Research needs. Initial reserach might be conducted in the area of compiling the inventory of natural assets mentioned under (a) above. This might be followed by reserach regarding currents and tidal flow which might carry pollution along the shores or out to sea.

Specialized research dealing with present or anticipated pollution from various organic, inorganic and industrial wastes and their impact upon the present ecology of the Islands might be undertaken at an early date.

e. Any other items. This statement is long enough. Comment under this heading is omitted.

The job outlined in this statement is enormous, but the results of a job well done will be appreciated and enjoyed not only by ourselves, but by generations to come. Thank you.

MR. TRAINA: Thank you very much, sir. That was a very fine statement. Any comments?

DR. ANDUZE: I would like to say this: I enjoyed noting Mr. McFarlane's outline of the proper safeguards and the establishing of agencies on each island.

It is true that St. Croix is rapidly becoming industrialized, and there is a great threat of industrial wastes being dumped into the coastal waters.

There are elements in each island that are different, and I think to get the proper representation, we should have representatives from St. Croix, St. Thomas, and from St. John.

Whoever is head of this department certainly would need to hear from both groups. But there are many unresolved questions as far as water pollution is concerned, and the need for good research, sound, meaningful research, is necessary -- however, there has been nobody to testify just how much the animal life of the bay is affected by fecal contamination.

Is the animal life or sea life affected more by chemicals and industrial waste? I remember at St. Thomas when we had gross contamination of the waterfront at that time, and the waterfront, where there was an abundant crab life and sea life, they're gone today.

So when we speak of the ecology of the Islands, we speak of the killing off of fish life and other sorts of life -- are they damaged by fecal contamination or is the damage greater by chemical contamination?

You notice in England how the chemicals used for the asphalt spill did more damage than the asphalt that was already there. So these are things that concern the citizens of our Island.

And the willingness of our citizens to speak out will play an important part in what we do. I would like to commend Mr. McFarlane on his approach to this problem, and I hope we can stimulate other members to come forward, and perhaps in the final analysis, we can pool the resources of the citizens and come up with a practical solution to our problems.

MR. TRAINA: I might add, this, I think, is one of the first times in my experience with the government that we have had such a situation where we have come to the states aksing them to participate in a pre-planning time -- this program authorized at the moment is just a three-year investigation to sort of look into this situation of the estuaries and estuarine management.

So we are happy to hear from you people just what the problems are.

For a change of pace, we would like to call on Miss Lucia Nelthropp. I guess Miss Melthropp is not here.

The next individual we have is Mr. Sunderlin, representing Harvey Alumina.

MR. RUSSELL SUNDERLIN: I am Russell Sunderlin, Assistant General Manager of Harvey Alumina. Mr. Chairman, Dr. Anduze, Mr. Francois,

ladies and gentlemen: Our statement is as follows:

"Harvey Alumina supports an objective, comprehensive study of the effects of pollution on estuaries and estuarine waters of the United States as provided for in Title II, Section 5, (g) (1) Clean Water Restoration Act of 1966.

"We believe that by pooling the knowledge, capabilities and resources of federal, state, and local agencies together with specialized knowledge available in industry, a productive study can be made.

"As it applies locally, such a study should be directed to the determination of:

1. General water circulation system.

2. Currents.

   a. Surface and subsurface
   b. Strength and direction as a function of time
   c. Effect of wind, wave, tide, littoral drift

3. Eddy diffusivity or dispersion characteristics.

4. Density structure, salinity-temperature-depth relationship.

5. Wave and swell effects.

6. Submarine topography.

and to the determination of the beneficial uses, such as:

1. Water contact sports.

2. Marine recreation.

3. Fisheries, economic and sport.

4. Industrial commercial cooling, et cetera.

5. Waste disposal.

6. Others.

"Only with a definite knowledge of the above factors, as they pertain to local waters, can an intelligent establishment of reasonable criteria to preserve the beneficial uses of our estuarine waters be made.

"In view of the above, it is respectfully suggested that a small committee of people knowledgable in the field be established to assist

Dr. Roy Anduze in coordinating Virgin Island interests in this study.

"We would be happy to volunteer someone from our organization to serve on such a committee."

Thank you.

MR. TRAINA: Thank you, Mr. Sunderlin. I would like to ask one question or make a comment. Do you see such a group as a continuing kind of a group established to feed information to and get information back as a useful tool for you with industry?

MR. SUNDERLIN: Yes, I think that Harvey's attitude is that a continuing observation and evaluation of what's going on is the proper way to go about these things, and I would like to supplement Mr. McFarlane's point, the local aspect of this thing is most important.

We are prepared to consider -- well, as a matter of fact, we do consider ourselves a member of the community, and we hope to be just as responsible as we would expect any other members in any community to be.

DR. ANDUZE: When you mention one central water supply, do you mean potable water, desalinized water, or do you mean industrial water supply consisting of salt water for flushing?

MR. SUNDERLIN: I don't think I used that term. I believe I said, "As it applies locally, such a study should be directed to the determination of: (1) General water circulation system."

This is in reference to the circulation of water in our coastal waters.

DR. ANDUZE: You're speaking of estuarial waters?

MR. SUNDERLIN: Yes.

DR. ANDUZE: Thank you.

MR. TRAINA: Thank you very, very much.

Next we have Mr. Walter Ammon, W. G. Ammon Corporation.

MR. FRANCOIS: Mr. Ammon might be in St. Thomas.

MR. TRAINA: Mr. Edgar Mullgrau. Mr. Mullgrau is with the Virgin Islands Association of Architects, Engineers, and Land Surveyors.

MR. EDGAR MULLGRAU: My organization strongly feels that a study or survey of the estuarine problems here in the Virgin Islands is sorely needed, not only from the standpoint of conservation, wildlife, and things of that sort, but also from the standpoint of what is going to happen to our coast line in terms of further development in St. Croix.

By that, I mean we anticipate a central system here with natural outflow of sewage and things like that going toward the south side in the estuary.

We are supposed to be having sewage treatment plants, which, as we all know, the effluent still carries a certain amount of Escherichia coli and other pathogenic organisms.

What will become of this sewage when it is dumped into our estuaries in and around St. Croix? As far as the Association is concerned, from an aesthetic and architectural point of view, we think that if this occurs to any great extent, it would be a deterrent to the further development of St. Croix in terms of our economical well-being and in terms of our social well-being.

Because of that reason, we would go 100 per cent behind the federal agencies in making a thorough survey to come up with corrections in terms of not today, but in five years from today, or ten years from today, when it is believed that the population index for the Island will be considerably increased. Thank you.

MR. TRAINA: I would like to ask some questions. Of course, you have some unique problems with regard to water pollution control here, especially from an engineering point of view.

Has your Association directed itself in terms of closed systems for water supply or for sewage disposal, for that matter? Has there been much of this kind of discussion, if anything else?

MR. MULLGRAU: No, we have not dealt with that in detail at this time. However, that is on our program. When I received the letter from Mr. Thoman -- I think he is your Regional Director -- we considered having somebody come here and make a short statement to let you know exactly how we feel concerning this entire matter and the need for this survey to show us how to approach this pollution of our estuarine areas.

MR. TRAINA: I might add, as we mentioned earlier, we will keep the record open for 15 days. So anything your Association would like to send to us, we would be more than happy to include it.

MR. MULLGRAU: All right, sir.

DR. ANDUZE: How does your Association feel about the reuse of water?

MR. MULLGRAU: The reuse of water, as far as the Association is concerned, is apart from the aesthetic aspect of it. They feel that it is a parctical approach.

It is also a functional approach, provided, of course, the total destruction of organisms detrimental to welfare and all that, has been diminished.

DR. ANDUZE: Do you think the community will accept the reuse of water for industrial purposes or agricultural purposes?

MR. MULLGRAU: They might go along with us, provided that they are prepared in advance, in terms of educaticnal programs.

The Department of Health and other agencies involved will maintain to the public and so forth this stuff is coming back, it's all clean, and clear and healthful and all that.

There will be no pollutants, no pathogens, no this, and that and the other, to make the people sort of feel that this sewage is something healthy and not harmful.

DR. ANDUZE: Do you approve of this system of increasing the yardage of outfalls or increased chemical treatment of the effluent? Which would you prefer? Which would you recommend?

MR. MULLGRAU: Speaking personally, I would prefer increased chemical treatment of effluent, of course, rather than running the effluents further out into the ocean.

DR. ANDUZE: As I understand it, you would prefer to chemically treat sewage and dump it into the bay, rather than sending outfalls further out? Of course, we assume an oceanographic study would be made with regard to the currents.

You feel that this chemical treatment would be more workable --

MR. MULLGRAU: Provided, however, that a chemical treatment has been such that it will not leave any harmful residue to natural resources, such as fish life and things like that.

DR. ANDUZE: Well, do you know of any chemical that is strong enough to treat the body coli that you mention that wouldn't harm animal life?

MR. MULLGRAU: Not offhand, no.

MR. TRAINA: I think this back to the point that was made earlier about the need of research. When we talk about estuaries from a scientific point, we are talking about an area that very few people know about.

I think before we arrive at some of these designs, we have to look more into the system and see how it works.

MR. MULLGRAU: Thank you very much.

MR. TRAINA: I would next like to call on Lee Morris, St. Croix Diving Association, Fairleigh-Dickinson University.

MR. W. LEE MORRIS: Dr. Anduze, Mr. Traina, ladies and gentlemen: My name is Lee Morris, and I am representing the St. Croix Diving Association and also I am representing Fairleigh-Dickinson University.

I have been a resident of St. Croix since 1964. I taught science here at St. Dunstan's for one year. I have traveled a great deal under the water around St. Croix, around Florida and the Bahamas.

Pollution, so far as I see it, is an act that renders water unfit for its intended use. We have several kinds of pollution, organic pollution, or organic waste, which we know comes from both humans and animals.

We also have organic waste from food processing, or in the Virgin Islands, rum processing. We have pollutants that pollute the waters from insecticides, petroleum products, radioactivity, and metal poisons.

We have dissolved or suspended solids, silt from runoffs or runoffs from drains. We have dredge silt, and last, but not least, we have thermal pollution.

I would like to make a few comments on each of these particular types of pollution. Most of you here are aware of the sewer outfalls we have, both in Christiansted and Frederiksted.

Probably you haven't been as close to these sewer outfalls as I have been personally, because I am by nature a very curious individual. Sometimes I might get myself into a great deal of hot water on account of it.

Last year, the Virgin Islands government requested bids for a sewer, for laying of a sewer outfall line in Frederiksted. I had no experience along these lines, but a group of my friends who are also divers decided that we would survey this area and see if it seemed to be feasible that we go into a new venture under the water.

We surveyed these small sewer outfalls that run from the fishermen's market there in Frederiksted. The bid was to lay this line 180 feet from land out.

The water was, at the deepest part, 22 feet deep. It seemed to me at the time that this was not really far enough. We studied the situation, we took a few pictures, but unfortunately, none of them turned out very well.

We nosed around here and there and could really not come up with too many conclusions, because of our lack of knowledge about outfall systems. The only thing that I could actually state about this Frederiksted outfall survey that we did was that there seemed to be quite a few fish in the area where the sewage outfall deposited its waste under the water.

Now, along the same lines of sewer outfalls, most of us who have been on St. Croix for a number of years are quite familiar with the Christiansted outfall that deposits most of Christiansted's sewage on the north side of the reef, practically within sight of us in this room.

Our prevailing winds here are from the east, but occasionally, they will shift around to the north, and particularly during this period of the year, they will come from the north sometimes for weeks on end.

Unfortunately, the outfall's placement on the north side of the reef allows the wind to blow whatever floating matter comes out of that outfall system right back over the reef and into the southern area of the Christiansted lagoon.

Unfortunately, after a north wind dies down, you can almost -- well, you can smell the sewage anywhere along the coast down from Golden Rock almost to Pelican Cove Beach Club.

I think this will be corrected in the future by a sewage treatment plant. But to us who are here right now, things seem to move so slowly, and with the population of the island increasing as much as it has been, I certainly hope that the Virgin Islands government will pull out all stops to get a sewage treatment plant in St. Croix in the very near future.

I have not done too much surveying in the areas of seaside hotels on St. Croix. We have quite a few, but I suspect that we have raw sewage coming from seaside hotels under the sea also.

This is just my own personal feeling on the matter. Rum processing is a type of organic, or discharges a type of organic waste. If you are in the area of Frederiksted approaching the airport on a hot day, you can certainly tell that there is rum-processing waste flowing down a little estuary there towards the sea.

Under the topic of poisons, I think petroleum products is probably the most predominant concern that we have here, since we have our new Hess Oil Refinery on the south side of the island.

I might also inject a positive thought here, that is, from my standpoint, it seems that Hess and Harvey both have done an excellent job in setting up their harbors so that if an accident occurs within the harbor and there is seepage or spillage of any chemical, these areas can be contained almost 100 percent until the chemical is taken care of, and is cleaned up.

In the future, we will probably have some problems with thermal pollution from our desalination plant down in Christiansted Harbor,

but I think this will be very minor because the area has been thoroughly silted over and there really isn't too much life there to kill any more.

The agencies or the businesses that have been pumping sand out of Christiansted Harbor have done a very good job of silting over the grass and killing the shellfish in that area.

It will take many years for that to return. I think one of the largest or biggest disappointments I have had since I have been in the Virgin Islands was reading a story in the "San Juan Star" shortly after a government agency awarded a large marine laboratory facility, and that story was, or that paragraph in the story that concerned me was, the reason St. Croix was not chosen for this marine laboratory was that the south side of the island had been completely ruined for study of ecology and marine biology.

I don't know from my personal survey if this is true. I just know that a lot of fishermen, native fishermen, from that section of the island, have had to change their habits in fishing places because of the silt from the dredge areas over around the industrial section of the island.

Dr. Anduze, you mentioned chemicals doing more damage in England than the actual petroleum or asphalt. This has been very true in Puerto Rico.

A very prominent marine biologist from Puerto Rico has gone on record as saying the detergents and other things that were used in Puerto Rico to try to do away with the crude oil that spilled from the Puerto Rican tanker have done more damage than the crude oil would have done.

Thank you, gentlemen, for allowing me to speak my piece. If there are any questions, I will be happy to try to answer them.

MR. TRAINA: I just have one comment, Mr. Morris, regarding your last statement about use of detergents in Puerto Rico.

This agency was down there the entire time. After the first few days, we advised the authorities there not to use detergents which they had begun to use.

We have been very much aware of the problems regarding detergents in controlling oil spills. The use of detergents was stopped rather quickly.

DR. ANDUZE: I would like to thank you for making such a thought-provoking presentation. Now, water pollution, if it changes the water for the purpose for which it is intended, as far as people who are

interested in diving, they would like to maintain the water in a certain state, but, of course, if you're going to bring an industry in, it will temporarily destroy animal life.

Well, I know how you feel, because being a horse lover, I was angry because I couldn't run my horse up Raphuna Hill because of the traffic. I don't think that the government would allow me to stop the traffic so I could ride my horse.

The executive branch has to be aware of many, many factors. However, I would like to point out to you some of the problems that you have indicated have been taken into consideration in Christiansted, pumping stations, south road interceptors, cross-city interceptors -- this will amount to some $2,840,000.

I mean, this is a proposed expenditure to take care of some of the problems. I will have to agree with you that this should have been done before. I don't even think with the bonding authority -- the local government can only go so much in debt.

There is no unlimited debt to which it can subject itself, although you can answer and say this can be made a revenue-producing bonding indebtedness.

MR. MORRIS: I don't want to be misinterpreted to the extent that I leave a feeling that I am completely negative with the government's attempts.

I do feel that the government is a bit slow, but most of us who act rapidly to change feel this way: that most governments do have to gain some impetus and get some good ideas before they continue on in a head-on rush-in on pollution.

But like you said, there have to be certain surveys. These things must be done before you can hop in with both feet. But this is a step in the right direction.

DR. ANDUZE: I would like to say this: We are public servants, and we need a stimulation of people like you to challenge us into using all the brain power we have.

I did want to let you know that the government was aware of this situation, and the government is moving slowly, but we are going to try to correct it, and I think -- I repeat again, I thought your presentation was very thought provoking.

MR. MORRIS: Thank you. One other thing. I don't want to leave the impression that I am against all industry coming to St. Croix. That's certainly not the case.

I feel that we need this diversification in our economy, as long as it's contained in that particular area which is already now desecrated.

MR. FRANCOIS: I would like to ask you two questions. Have you been on the south coast recently? How is that area now?

MR. MORRIS: Personally, no, I have not been there recently. Being a diver, I spend most of the time looking for clear water. My reports are strictly second-hand from most of the native fishermen I know that used to fish in that area.

MR. FRANCOIS: Is there any dredging being done in the harbor now?

MR. MORRIS: I believe there is dredging being done there presently. A sand company -- I don't know the firm that is doing this dredging -- plus, there is another dredging outfit over next to the entrance to Allatoona Lagoon on the east side of the harbor.

MR. FRANCOIS: Thank you.

MR. TRAINA: Mr. Morris, again, thank you. We appreciate your coming.

Next we have Mr. Richard Newick, president of Sea Rovers, Inc.

MR. RICHARD NEWICK: My name is Richard Newick. I am a boatbuilder and designer. I operate a fleet of charter boats. I am a member of the St. Croix Chamber of Commerce, member of the St. Croix Yacht Club.

I would like first to talk about municipal sewage, which we see a great deal of in Charlotte Amalie Harbor and some in Christiansted Harbor.

Charlotte Amalie Harbor today is an open sewer. There are several million dollars' worth of yachts in Charlotte Amalie Harbor, and they bring a great deal of business to the island, and they leave as soon as they can with their guests, because it's such an unpleasant-smelling place to stay.

We have ships carrying thousands of guests coming into the harbor for days, or usually a day, and as far as I know, Dr. Anduze, I am sure you could tell me, there is no connection for the ship sewage systems -- they dump their sewage right into the harbor, is that correct?

DR. ANDUZE: That's correct.

MR. NEWICK: And I think this is the situation in all of the world's large harbors. There is no international agreement that ships cannot dump sewage in harbors.

This will have to come, and it will have to come soon. A regulation to prohibit large ships from dumping unlimited sewage into the rivers they use must also come.

MR. TRAINA: There are regulations regarding ballast water. There is some regulation now being proposed that will cover small boats, houseboats, and recreational craft.

MR NEWICK: I am glad you brought that up, Mr. Chairman. There are regulations in many states today that have been just passed in a panic in the legislatures in the last two or three years to control the sewage that is discharged from yachts, and I think it is very unfortunate that yachtsmen don't have the political base that the large ship owners do to fight their cause, because a yacht or a fleet of a thousand yachts, each with one person aboard, is still contributing less sewage in the harbor than compared with one large ship.

One Navy ship in Charlotte Amalie Harbor, multiplied by four Navy ships, doubled by three medium-sized ships, will dump as much into the harbor as the whole town does today, and the town is dumping all of its sewage into the harbors, I understand.

These things are infinitely more important than regulating ten houseboats or 50 yachts.

MR. TRAINA: I guess the old adage, "Every litter bit hurts," applies.

MR. NEWICK: Every litter bit hurts, and the man that can least fight back is the owner of a small boat, so he gets hurt first with the regulations, with unenforceable regualtions, and this is what I would hate to see happen in the Virgin Islands.

I would much rather see the government prohibited from dumping sewage in the harbor, millions of gallons of sewage into the harbor, than I would see the owners of a hundred yachts prohibited from dumping their one per cent of sewage into th harbor.

I think that first things should come first. If we are going to regulate the small craft, let's regulate them in their order, which is right down to the bottom of the list.

Christiansted Harbor is much the same. The sewage outfall was probably improperly placed. I have talked to local politicians who assure me that it was good, because everything went west, but these local politicians, although they were born and spent their lives here, have never spent an hour in Christiansted Harbor, and they don't know what they're talking about.

I would like to talk for a moment about oil on beaches. Then years ago -- 12 years ago -- when I came here, there was no oil on our beaches. That's one reason I stayed here.

Five years ago, there were specks of oil on our beaches occasionally. Today we have globs of oil and small lakes of oil floating into our beaches, tarry, thick oil that becomes liquid in the hot sun and gets all over the feet of our guests, gets all over the decks of our boats, which we spend hours to fight, and it's a losing battle.

We are not equipped to fight it, and I don't think those of us who are represented in this room are equipped to fight it with legislation. It's got to be internationally controlled.

It's got to be controlled internationally.

MR. TRAINA: Do you know where the source of this is?

MR. NEWICK: I do not know as a fact, but I know as an educated guess it's coming from passing tankers blowing their ballast tanks. The reason that I don't know it as a fact, you can't talk to a tanker skipper and get him to admit that he pumped out 5000 gallons of oil that was mixed with 50,000 gallons of water, because it wasn't -- he is not going to tell us that.

His owners aren't going to admit it either. It's an economic fact of life that he is -- he is an island unto himself out on the sea. He answers to no man.

MR. FRANCOIS: Is this oil coming up in certain sections of the island, or all over?

MR. NEWICK: I am mostly familiar with the north coast.

MR. FRANCOIS: Buck Island, the Yacht Club?

MR. NEWICK: I have seen 16 messes of oil come in there in the last few months. I doubt seriously if it's coming from any local ship that is coming here.

I think they are too smart to do something like that too close to the beach, but a glob of oil that is discharged off the coast of Africa is going to end up on St. Croix's beaches.

No matter where it is discharged, it's going to stick together until it comes to a beach.

MR. TRAINA: Have these been reported to any territorial agency?

MR. NEWICK: Not by me.

MR. TRAINA: I think the United States Coast Guard has had response in this area. This agency is getting some response in this area.

MR. NEWICK: In the past, the Coast Guard hasn't had enough personnel to enforce the laws that are on the books now, and I have given up reporting things to the U. S. Coast Guard.

MR. TRAINA: All of us in governmental work face this fact of lack of personnel and so forth. There is before the United States Congress, with regard to oil pollution, ligislation to make it a very severe penalty for the discharge -- willful discharge -- of oil.

MR. NEWICK: Willful discharge of oil. Some Congressman put in that work "willful" there and made the law absolutely unenforceable. They are just words. They don't mean a thing.

Just because some Congressman put the one work "willful" in, there is nothing the government can do about the oil that is floating on our beaches and in our waters today.

I still maintain that there is nothing that can be done on a local, state or national level to control a Greek tanker 500 miles from St. Croix from pumping his ballast tanks with whatever he has got in them just because it's cheaper for him to run through the Caribbean with half of his ballast after he had to cross the Atlantic with all of his ballast.

He saves his owner's money, and he is going to do it. No matter what law we write in Washington, the only hope that that I see, gentlemen, is to have research come up with a cheap way for him to treat his ballast so it is discharged harmlessly.

I think this is a great responsibility of those who operate tankers and buy oil or use oil. I think this is a very high priority thing.

MR. FRANCOIS: We have also learned that during World War II there were about 40 ships sunk in this area, and after 20 years, those tankers are about to rupture now.

MR. NEWICK: My experience has been that iron under water doesn't rust. You may have seepage from these vessels -- I think that is quite likely -- but I don't know how we can prove where this oil is coming from on our beaches.

But it is here, and it is hurting tourism in the Virgin Islands today. I would like to say, in closing, that the heavy industry we have in the Virgin Islands today is artificial in the sense that it is not here on an economically sound basis.

It is here for political reasons, for tax reasons, incentives that come and go with administrations of Washington in the Virgin Islands. I think this isn't an attack on the heavy industry that was here.

This is what I feel is just a fact that should be recognized, the heavy industry is not based on natural resources here in the Virgin Islands, and because it is not, if it is no longer economically feasible for them to be here, I feel that in spite of their 50 million dollars' investment, they will very quickly leave when it's no longer economical for them to be here.

But we will always have some sunshine and we will always have beaches, and these things are vital to the Virgin Islands. Anything that you and the government can do to help us protect them, you will find a lot of support from people like myself. Thank you.

MR. TRAINA: Thank you very much, sir.

The next gentleman we have is Mr. Anthony Ayer, who is first vice-president of the Frederiksted Civic Association.

MR. ANTHONY AYER: Mr. Chairman, my name is Anthony Ayer. I am from Frederiksted. I am a realtor and have been a resident of St. Croix for approximately 18 years. I am speaking as first vice-president of the Frederiksted Civic Association and as a member of the St. Croix Chamber of Commerce.

The variable shore line of these Virgin Islands can readily be divided into three categories. The first is rock coast line, sometimes falling several hundred feet directly into the sea.

Over 40 percent of St. Croix's shore line falls in this category, and the majority of it is neither accessible nor readily developable for recreation purposes.

The second category could be described as waterfront that can be developed, such as swamps, lagoons, bays and natural inlets. About 40 percent of our coast line is in this category.

In the coming years, these areas will be developed to provide the increased recreational and residential needs of our island. In some instances, the extremely high cost of drainage, dredging, blasting or bulkheading will slow down the inevitable, but only temporarily.

The third category consists of our natural and artificial harbors and beaches that already exist. This last group constitutes less than 20 percent of the existing shore line, but in terms of use by population, over 80 percent of all water-oriented activities, whether recreation, commerce, or industry, takes place on or about this 20 percent of our shore.

In terms of pollution, we can ignore the first category of rocky coast line. It is not now polluted by natural process and is either unusable or inaccessible by man, hence there is no artificial pollution to any great extent.

The second category of developable shore line is already polluted by nature, or, as I refer to it, the natural process of vegetative and animal decay.

Artificial pollution by garbage dumps, private sewage fields and wholesale raw human waste by government disposal systems are rapidly increasing the pollution of these areas.

By nature, these swamps, lagoons and estuaries contain porous sand and mud that absorb the waste materials. Also, in most of these swamps or bays there is little or no ocean current or tide to assist in the cleansing flow of sea water.

The waste stays where it was left and rather than disappear, will become greater as more vegetation dies and more artificial pollution is added.

The third category, that of developed coast, such as beaches and harbors, is rapidly being polluted by artificial means, rather than, as in the previous case, by nature.

Fortunately, our beaches are still swimmable, but for how much longer? Our harbors, both Christiansted and Frederiksted, are in immediate peril; however, Port Harvey and the Hess complex are to the best of my knowledge, still relatively free from artificial pollution though natural pollution and silting are evident at Port Harvey.

Raw sewage is presently being discharged directly at the shore line in Frederiksted in three different locations. There are two old cast-iron outfall lines to carry sewage from town.

These originally extended about 100 feet out to sea, but have since broken up or cracked so that raw sewage floats to the surface within 25 feet of shore.

A new sewage outfall is presently being constructed south of town near the fish market. I understand that this is a pressure outfall that carries raw sewage from the new housing project out to sea for a total of approximately 600 feet.

At that point, the sea bottom is approximately 18 feet below sea level and consists primarily of sand with some coral outcropping and sea growth.

The raw sewage will, to some degree, be absorbed by the sand. The sea currents at this distance from shore are constant, however,

and it is hoped that the sewage will be carried out to sea so that no pollution will occur along the shore.

The two broken outfall lines opposite Hill and Market Streets are not sufficient to introduce the sewage into the current, and as a result, residue is evident on the shore.

The Christiansted Harbor has much the same problem in that sewage appears along the shore within the harbor. The existing outfall carries to the leading edge of the reef or approximately 4000 feet from shore in a northeasterly direction.

The winds, waves and sea currents, however, come from the east and north, and, therefore, carry much of the sewage back inside the reef near Little Princess.

The water depth beyond the reef falls rapidly to over 500 feet and I submit that the outfall should be sufficiently extended so that the sewage is discharged well beyond the reef and near the sea bottom.

In addition to the previously mentioned sewage disposal problems, we have still in practice an archaic method of waste disposal commonly known as "night soil."

Slum properties in both towns often don't boast of modern toilet facilities, thus "night soil" is collected in cans and disposed of south of the airport near Estate Envy.

This sewage is dumped at the water's edge and is carried along the shore as it gradually disintegrates and dilutes, in the process, contaminating several beaches and resort hotel areas.

I have personally seen raw sewage awash at the Estate Carlton Hotel beach, which is directly west and over two miles away. I can only conclude that it originated at the "night soil" dump.

Pollution other than sewage is evident on our beaches primarily concentrated in proximity to both town harbors. This, I understand, is under direct jurisdiction of the Harbor Master's Office and the U. S. Coast Guard.

In addition to its being extremely hazardous to small craft, this pollution, in terms of tin cans, wooden and cardboard cartons, lumber, et cetera, is unsightly, but relatively easy to prevent if the officials in authority would exercise their powers more diligently.

This type of pollution is of great concern of all; however, it doesn't constitute the health hazard and permanent pollution

damage that raw sewage will cause in destroying our beaches, tainting our waters, killing our fish and bird life and eventually chasing our tourists back to the States.

What, then, is the optimum use and future development of our coastal resources? Government, both local and federal, will take part, as will private individuals, hotel interests and industry.

Existing beaches and commercial marine facilities will be in increasing demand. Larger piers must be built, existing facilities expanded and improved, more beach property made available to public use and in general, more adequate administration and policing of the resources we now have.

Developers will probably, in the near future, begin reclaiming some of our swamp lands to provide additional residential communities. Hopefully, such developments will provide beach facilities, marinas and other related recreational activities for the public.

In my experience, private projects of this sort are much more desirable and successfully constructed than government-controlled projects, primarily due to the red tape inherent in any governmental project.

Care must be taken that adequate sewage disposal is planned for in these reclaimed areas. Our local government has finally begun to face squarely the urgent problems inherent in disposal of human waste.

Let us hope, with assistance from the federal government, that adequate sewage and garbage disposal systems will immediately be constructed to halt the tide.

We cannot be content with a half-adequate job. A complete sewage treatment plant with a network of pipelines throughout the island is the only answer.

Small, individual treatment plants are not economically sound and extremely more difficult to administer if built by private individual developers.

The reprocessed water from several large government plants could be reintroduced below ground and substantially raise our water table. Waste solids can be processed and cured for mineral content or fertilizer, but only if rigidly controlled by health inspectors and chemists.

This is, then, the role of the local and federal governments. The private citizen, businessman, developer or industrialist has

the task of developing additional coastal areas for commercial, industrial and primarily residential and recreational use.

Perhaps thought should be given to the preservation of some of our marsh lands as bird and fish breeding grounds. If so, the land should be acquired by a specific government agency designed solely for that purpose.

Wildlife and marsh land refuges have well-known and proven value for the public interest. I submit, however, that public or private park and recreational areas are of much greater importance on our small island where land is already at a premium than for marsh land refuges.

Both public and private beach and recreational projects have their place in our society. Federal and local governments both must police and administer a certain number of such areas.

Private developers must do the same, but both should immediately concern themselves with the cause and prevention of pollution so that adequate steps can be taken to halt further damage to the rare and beautiful resources we now possess. Thank you.

MR. TRAINA: Thank you.

MR. FRANCOIS: This fecal material you saw over --

MR. AYER: I have seen it several times. I think the last time I saw it was about six months ago.

MR. FRANCOIS: Six months ago? Was the wind blowing, say, from the south?

MR. AYER: Southeast to east, bringing it right up to the shore.

MR. FRANCOIS: Thank you.

MR. TRAINA: Thank you, again, sir.

At this time, I would like to mention, we have received two communications from individuals who indicated they couldn't be here, but would like to have made statements.

One is from Mr. John R. Harms, who is representing himself. We have received another communication from Peter Sammartino, who is the chancellor of the Fairleigh-Dickinson University.

Both of these statements will be included in the record. I will now go back to some individuals we had called earlier. Perhaps they have come in now.

Mr. John Shultz. Miss Lucia Nelthropp. Mr. Walter Ammon. These are the individuals that I have listed. Is there anyone else I have not called that would like to make a statement at this time?

Are there any statements, then, that anyone would care to make at this time?

Dr. Anduze, is there anything you would like to add at this time?

DR. ANDUZE: No, not at the present time.

MR. FRANCOIS: No.

MR. TRAINA: I appreciate your all coming. I think it has been a very informative meeting, and from my standpoint, I have learned a lot this morning.

I would like to say that this is the fourth meeting that we have had, and I am very impressed with the level of knowledge and concern that has been expressed here.

I think we in the water pollution regulatory business need this kind of concern at the local level, as Dr. Anduze indicated, to inspire us on.

I do want to mention the fact that the record will be made available to everyone here registered. We hope to get published documents out -- I won't even give a date, but when we do, we will send copies to all of you who have registered.

Additional copies will be available in our offices in Atlanta and Athens and in Dr. Anduze's office here in the Islands. I think that is about all.

Wait just a minute. I have just received a note that Mr. John Moore is on his way and would like very much to make a statement. Why don't we take a break at this point.

(Short recess was taken.)

MR. TRAINA: I would like to now call on Mr. John W. Moore, Assistant Commissioner of Public Works.

MR. JOHN W. MOORE: Mr. Chairman, committee members, ladies and gentlemen: My name is John W. Moore, and I am assistant commissioner for the Department of Public Works on St. Croix.

At the outset of my statement, I would like to express appreciation to the Department of Interior, Federal Water Pollution

Control Administration, for this opportunity to discuss water pollution in our islands.

This is a problem of paramount importance to all of us who live and work in the Virgin Islands. As you know, gentlemen, these Islands, within the space of a few progressive years, have become one of the major tourist attractions under the flag of the United States.

Today, because of this administration's acute awareness of the advantages of national publicity, promotion and advertising, thousands upon thousands of visitors come to these beautiful shores and spend millions upon millions of dollars -- under the American flag -- each year.

This means tourism is our major industry. And the Virgin Islands are now in the process of developing another industry closely related to tourism, which, in my opinion, will add untold financial benefits to our islands in the years to come. This is the multimillion-dollar convention industry.

Last year, through the efforts of Governor Ralph M. Paiewonsky, the Virgin Islands were chosen as the site for the 59th Annual National Governors' Conference -- a high honor for any area under our flag.

The resultant publicity through state-side newspapers, magazines and radio and television has already produced tangible results in these islands. It is my understanding that several large conventions have already been booked into the Virgin Islands by large stateside corporations. More and more will seek our islands in the very near future.

There is another industry of major importance which is growing ever more popular in the Virgin Islands. This is the sport of game fishing. It is a matter of national record and local pride that the largest marlin ever caught was landed in our Virgin Island waters.

This brings us national recognition as a top-notch sports-fishing area. This industry, too, will grow.

I give you this background, gentlemen, to assure you that we in the Virgin Islands are very much aware of the possible dangers to our God-given assets, and to say that we are determined to protect our waters and beaches from water pollution.

We know that tourists, conventionaires and game fishermen come not only to our shores to enjoy our constant sunshine and temperate climate, but to swim, snorkle, fish and sail our crystal-clear waters and to sunbathe on our clean, white sandy beaches.

We are very cognizant of the fact that we are not the only land under the American flag which has sunshine and warm weather and clean waters. We know we must keep our coastal waters, estuaries, lagoons and harbors crystal clear and beautiful, because without them, we will lose our advantageous position in tourism and affiliated areas -- and lose them quickly.

So that our economic boat will not be wrecked by murky, dirty waters, this administration has taken positive, forthright steps to protect it from this danger.

It is now engaged in the planning of central sewerage systems for the islands which will be adequate up to the year 2015.

Before going into this project, I would like to say that the answer to this water pollution problem can only be achieved through the cooperation of all agencies involved.

By this, I mean not only the federal and local governments, but the cooperation of national organizations, federations, institutes, societies and councils that offer a wealth of the knowledge from their experiments, experience and general know-how in the field of antipollution, and the conservation of nature's assets in all communities of the United States of America.

We are also aware that a large amount of the responsibility for the success of this vital venture lies within our own community. Citizens of the Virgin Islands must be vigilent in keeping debris and waste materials away from our waters, not just today or tomorrow, but every day to come.

To bring you to date about what is being done about sewage in the Virgin Islands, I must take you back to December, 1961, or just seven months after Governor Ralph M. Paiewonsky was appointed governor of these islands by the late President John F. Kennedy.

At that time, the government entered into a contract with a firm of engineers who began studies into methods of effecting an up-to-date sewerage treatment system for these islands.

For various reasons, such as the population explosion, the results of this study were not acceptable to the administration.

After this setback, the government entered into a contract with the firm of Camp, Dresser and McKee, consulting engineers of Boston, Massachusetts, to conduct a four-part investigation.

This firm was asked to: (1) determine the alternate methods of constructing an intercepting sewerage system to transport the sewerage generated on St. Croix and St. Thomas to one or more

central points of treatment and disposal: (2) the alternate methods of treatment and disposal of sanitary sewage; (3) the adequacy of existing interceptors, lift stations, forced mains and outfalls now serving the areas of Christiansted, Frederiksted and Charlotte Amalie; and (4) the cost estimate of the proposed works, including a comparison of various alternate studies.

On November 23rd, 1966, the recommendation and proposals of Camp, Dresser and McKee, were submitted to the government.

To summarize its findings, the firm proposed a sewerage system designed for peak flows in the year 2015 with capabilities adequate for approximately a fivefold increase in population, a 67-percent increase in per-capita flow in the cities and their suburbs, and a 100-percent increase in per-capita sewage flow in the remaining portions of the islands.

The firm proposed a treatment plant on St. Thomas outside the City of Charlotte Amalie area on the western end of the airport to avoid the treatment plant effluent being discharged into the main harbor.

On St. Croix, a regional treatment plant is recommended near Krause Lagoon which would serve both the Christiansted and Frederiksted areas. The overall recommended construction for the Virgin Islands has been programmed in two stages on St. Thomas, and three stages on St. Croix.

Following the administration's acceptance in principle of the Clamp, Dresser and McKee report, the Legislature of the Virgin Islands, in April, 1967, passed a measure authorizing the governor to negotiate with this firm for engineering services in the preparation and completion of plans, design and specifications necessary for the implementation of the Camp, Dresser and McKee recommendations.

The governor did not immediately exercise this authority as the question of the effects of salt water on sewage treatment systems as proposed by Camp, Dresser, and McKee had not been given sufficient consideration in the initial report.

Following meetings with a representative of the firm, it was agreed that final engineering plans would provide for the use of salt water in such systems and a contract was signed for the execution of these plans.

The firm's initial proposals, as a result of meetings between insular officials, the Camp, Dresser and McKee representative, and the regional director of the Federal Water Pollution Control Administration, have formed the basis for a federal grant application, now being prepared, to assist the government in the implementation of these projects.

The applications in process will request construction grant allotments. In its quest to explore all means, techniques and methods available for the development of the most efficient sewage treatment systems for the islands, the government has further widened its approaches in this area.

On March 7, 1968, the government entered into contract with the firm of Engineering Science, Inc., to conduct a study on the feasibility of considering waste water purification and reuse in the islands.

These consultants have begun studies in this area on St. Croix, and on the basis of their findings, the government may find it feasible to construct a pilot plant utilizing this process.

Should such a decision be reached, however, the resulting purified water from this system would be used only for agricultural or industrial purposes and not for human consumption.

In conclusion, gentlemen, it is my strong feeling that with the already demonstrated interest by the government of the Virgin Islands, with the cooperation and counsel of the federal government, with the knowledge from organizations devoted to this problem, and with the diligence of the citizens of this territory, these beautiful islands should never suffer from the dangers of water pollution.

I thank you for the time you have allowed me to address you.

MR. TRAINA: Thank you very much, Mr. Moore.

DR. ANDUZE: Do you have any difficulty with regard to your pump station when the current is off, so far as it affects sewage disposal?

MR. MOORE: All of our pumps are electrical, and when the power goes off, I mean, we have no means of pumping, and this means that we are forced to use overflow bypass -- overflows, I mean -- to dispose of the sewage, and it's dumped in the nearest accessible spot.

DR. ANDUZE: Lesser of two evils?

MR. MOORE: That's right. This is pretty much common practice any place where they are using sewage disposal plants, or outfalls or lift stations, one kind or another.

DR. ANDUZE: Do you feel if we increase the power facility in the Island of St. Croix that this will be ameliorated to some extent?

MR. MOORE: I will say that it will become almost a negligible factor. However, there is always that little point that you may have a plugged line, or you have this or that or the other, and there

are going to be times when there is going to be a small amount of sewage that is going to find its way into our good shower water.

This is almost impossible to get around.

DR. ANDUZE: The mechanical factors.

MR. MOORE: There are mechanical factors that can't be controlled. The amount that would be passed in such an event would be a very small quantity and would have practically no effect on the --

DR. ANDUZE: From an aesthetic viewpoint, it is not desirable?

MR. MOORE: Well, obviously, it's not desirable.

DR. ANDUZE: Thank you.

MR. TRAINA: Mr. Moore, getting away from the sewage for a moment and going to this matter of dredging, this came up earlier.

Does public works review with the federal government the Corps of Engineers' applications for dredging permits and so on?

MR. MOORE: Well, I might -- as far as I am concerned, in St. Croix, we do not. I believe that this is a matter that is handled in St. Thomas through an agency, and government agencies there, and the Department of the Interior.

MR. TRAINA: I know we in the FWPCA at the federal level are a great deal more involved in these reviews and find that water pollution just goes beyond sewage, and silting from dredging operations is becoming rather critical.

I thought perhaps --

MR. MOORE: You're entirely right about this.

MR. TRAINA: Well, again, thank you very much, Mr. Moore.

MR. MOORE: You're quite welcome.

MR. TRAINA: Any other individuals remaining that would wish to speak?

Well, again, thank you all for coming. On my behalf, and speaking for Dr. Anduze, if I may, we appreciate your coming here, taking your time to give us the benefit of your information.

The meeting is adjourned.

(Whereupon the hearing adjourned at 11:05 o'clock a.m.)

PUBLIC MEETING
NATIONAL ESTUARINE POLLUTION STUDY
FEDERAL WATER POLLUTION CONTROL ADMINISTRATION
Senate Building, Charlotte Amalie, St. Thomas, Virgin Islands

April 19, 1968

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The public meeting directed toward obtaining contributions from the Virgin Islands interests regarding the National Estuarine Pollution Study being conducted by the Federal Water Pollution Control Administration convened in the Senate Building, Charlotte Amalie, St. Thomas, Virgin Islands, Friday morning, April 19, 1968, and was called to order at 9:30 a.m. by Dr. Roy Anduze.

DR. ROY ANDUZE: Ladies and gentlemen, this is a hearing on the Clean Water Restoration Bill and the conditions of estuaries and streams throughout the United States and territories.

We are honored to have with us this morning Mr. Traina, who represents the Regional Director, Southeast Region, Federal Water Pollution Control Administration of the Department of the Interior, Mr. John R. Thoman.

These hearings, as I understand them, are for the purpose of finding out what is going on in the territory with regard to water pollution in regard to the state and character of our coast line and the water that surrounds it.

It is supposed to give the federal government information which would be of value to them in planning to correct some of the evils that presently exist.

Mr. Traina is here to collect information. He is here to learn from you what the problem is, and when the territory, the state and federal partnership has been firmly established, we hope that with time and effort we will be able to correct some of the evils which exist along the 175 miles of coast line we have here in the Virgin Islands.

I can assure you that Mr. Traina and members of his staff are very knowledgeable people in connection with this problem. So at this time, I will let Mr. Traina take over.

MR. PAUL TRAINA: Thank you very much. Dr. Anduze has explained our mission, but I will give you a little more specific background.

The last amendment to the federal legislation on water pollution control, the Clean Water Restoration Act, called for a three-year study of the nation's estuaries.

As part of this study, we have been conducting public meetings throughout the states and territories. I represent the Southeast Region -- and let me add a personal note here: Mr. Thoman, regional director, regrets he could not be here this week.

It appears that Senator Muskie is holding a hearing on thermal pollution in Miami this week, and it was necessary for Mr. Thoman to be present.

We in the Southeast have held four public meetings. This is the fifth meeting. The first three were held in Mississippi, Georgia and Florida.

Earlier this week we held a meeting in St. Croix. Next week we are planning to hold a meeting in Puerto Rico. Then probably sometime in the summer we will conclude, as far as our region is concerned, with a meeting in Alabama.

The meetings are to get the interests, the opinions, the information from the local groups involved in estuaries and estuarine management. As I say, the law, which authorizes this study, specifically calls for that information, and we are getting that information.

I know most of you have received letters inviting you to be here on behalf of both the regional director of the FWPCA and the governor. In those letters there was information, more specific information, including a booklet on the study.

The record of this meeting will be held open for 15 days after today to allow anyone who would like to submit a statement to be included in the record.

We have with us Mr. Tommy Crites, our court reporter, who will be taking the verbatim minutes of our meeting. The information, both written and oral, will be printed in a report which will be sent to all of you who have registered here.

We will have extra copies to provide to Dr. Anduze for further distribution, and, of course, we will have copies of the report in our own offices in Atlanta and Athens.

I think with these brief remarks that we will proceed with our meeting. We have received here a list of individuals who have indicated they would like to make statements.

I would like to start off with Mr. Thomas R. Blake, director of the Virgin Islands Planning Board. Is Mr. Blake here?

DR. ANDUZE: Not yet.

MR. TRAINA: Then I would like to call on Mr. Edward J. Moran, vice-president of W. G. Ammon Corporation.

MR. EDWARD J. MORAN: Mr. Chairman, first of all, let me say, I am representing Mr. Walter G. Ammon, president of the corporation, who is fighting a strep throat.

These are his remarks. He is here today, and he had hoped to present this statement, but under the circumstances, I think he had better not try to go through with this. These are his remarks:

"I come before you today as a citizen who is vitally interested in the environment in which he lives and one who feels that every citizen has a responsibility to preserve, not destroy, natural resources.

"I also come before you as president of the W. G. Ammon Corporation, a Virgin Islands corporation that specializes in water and sewage treatment.

"Our corporation has, for the past six years, been directly involved in coping with this particular problem. In addition to commercial and residential plants, we have had the pleasure over the years of working with various departments, with and for various departments of the government of the Virgin Islands charged with the responsibility for sewage treatment.

"It may be of further interest for you to know that the W. G. Ammon Corporation retains the services of Reynolds, Smith & Hills. They are consulting architects from Jacksonville, Florida, and a firm that has impeccable reputation in many fields, including water supply and sewage treatment.

"I will present you with a copy of their credentials with this presentation, if you would like to have it for the record.

"Dr. Charles Harding, a partner in the firm and responsible for this Environmental Sanitation Division, has worked very closely with us on a number of projects in these islands.

"As a matter of fact, Dr. Harding is here on an assignment for us, and we have asked him to be present today to answer any questions that you might have after this presentation.

"Now, before I get into the text of the speech, or if it is permissible, and if the slide projector works that we have brought along, I would like to graphically explore with three or four or five slides what we think the problem is.

"These are slides that were taken in January of this year of the Virgin Islands and graphically present the water pollution problem that we will all hear about and are all concerned about.

"May I have a little help with that slide projector."

MR. TRAINA: Is there a possibility of our getting prints of these slides?

MR. MORAN: As the presentation explains, I will give you a copy of a report that we made that has the pictures in it. But if you would like to have the slides themselves, I think we can have copies made for you.

MR. TRAINA: I think it would be most helpful.

MR. MORAN: We did an extensive study on the waterways of the Virgin Islands.

MR. TRAINA: We won't be able to print it in color.

MR. MORAN: You're welcome to have them, in any event.

MR. TRAINA: Thank you.

MR. MORAN: I would like to beg your indulgence for just a moment. The projector and the slides just arrived this morning. Thanks to the post office, they delivered it bright and early this morning.

This shot here is the one opposite the tennis courts down here in Long Bay, I believe. As you can see, there is a discharge of raw sewage into the harbor.

Jerry, would you be good enough to point out the areas we are talking about to move this along. This is down near the tennis courts toward Yacht Haven. You can see where the raw sewage is being discharged now into the harbor which is causing, of course, a pollution problem there.

This is St. Thomas. This is another area near the new junior high school in the land-fill area that shows a discharge into the bay area of raw sewage.

This is St. Croix -- this shot is just opposite the Harvey and Hess projects on the shore line.

("By the distillery -- down by the distillery" was heard from the floor.)

MR. TRAINA: Excuse me. Is that silt there? That material?

DR. C. I. HARDING: This picture shows the silt from the dredging operation which discolors the inshore water, beginning at the channel area. This does carry along the whole south shore.

This is rather dim, but in approximately the center position, there is an area which occasionally does have raw sewage discharged at Christiansted Harbor.

This shows some of the silt -- this is in the industrial area. This discoloration that you see going through here is from dredging operations, but at the time this picture was made, we don't know what it was, but something was being discharged here and being carried along the shore.

These are the slides that show the nature of the problem.

MR. MORAN: We thought those slides could more graphically present than I could have the problem we are presenting ourselves to and one we are all interested in correcting.

And this is Mr. Ammon's prepared speech:

"Mr. Chairman, based on our experience in the field of sewage treatment in these islands for the past six years and research completed by my firm, along with our consulting engineers, I am presenting the following information in an effort to shed additional light on the scope of the problem of water pollution in these islands, and our solution for solving it.

"As you may know, the Virgin Islands is enjoying a growing tourist industry, a thriving economy and is expanding and diversifying its industry.

"The Virgin Islands is enjoying this growth not only because more people have more money to spend, but because the islands themselves have been blessed with an ideal climate, crystal-blue water, beautiful beaches, lush vegetation, commanding mountains and abundant marine life.

"The repid development of these islands places them on the threshold of a population explosion that will more than double the present population by 1980.

"Public services, sewer, water and electric power, must be provided if this growth is to be orderly and beneficial to the islands. Growth will be severely curtailed if these facilities are inadequate.

"Based on estimates of the Virgin Islands Planning Board, the 1970 population of the Virgin Islands is estimated to be 63,000 with growth to 119,000 by 1980, and 150,000 by 1990.

"In St. Croix, the population is expected to increase to 26,000 by 1970, and 45,000 by 1980, with the majority of the increase in the central St. Croix area.

"In St. Thomas, the population is expected to grow to 70,000 by 1980, a fourfold increase over the 1960 census. The 1970 population is estimated to be 36,000.

"The increase is expected to take place predominantly in two districts -- Charlotte Amalie and Tutu. Included in Tutu area are Red Hook, Mangrove Lagoon and Tutu itself.

"St. John is expected to grow to approximately 1,800 to 2,000 people by 1980.

"As I stated earlier, if this growth is to be orderly and beneficial to the islands, public services, sewer, water and electric power must be provided. For purposes of this statement, I will confine my remarks to water and sewage.

"Affecting the volume of sewage, is the consumption of water. On the island of St. Thomas, water consumption is expected to increase from an estimated 3.1 million gallons per day in 1970, to 5.2 million gallons per day in 1980, and 8.1 million gallons per day in 1990.

"St. Croix consumption will also increase from an estimated 1.6 million gallons per day in 1970, to 3.2 million gallons in 1980, and 5.5 million gallons in 1990.

"Now, sewage volume in St. Thomas is estimated to be 2.3 million gallons per day in 1970, 5.2 million gallons in 1980, and 8.1 million gallons in 1990.

"St. Croix sewage volume is estimated to be 1.6 million gallons per day in 1970, 3.2 million gallons in 1980, and 5.5 million gallons in 1990.

"The existing waste collection and disposal facilities do not meet the needs of the islands, and, for some areas, do not exist.

"Raw sewage and industrial wastes are being dumped into the waters and harbors destroying their natural beauty and precious marine life, polluting the beaches and, most important, creating a possible health hazard.

"The size of the problem is best illustrated by the amount of money it will take to solve it. The solution is estimated to cost between 15 to 30 million dollars.

"If remedies are not forthcoming quickly and effectively, growth in these islands will be severely curtailed and will, in our view,

place in jeopardy everything we now have going for us.

"What is the solution? How do we dispose of vast amounts of sewage without polluting and destroying our natural resources? Our detailed recommendations are contained in a written report that I will give you, along with a copy of my statement.

"Briefly, however, we propose a three-phase water quality restoration master plan for the Virgin Islands. Phase I is designed to immediately correct the most critical water pollution problems which now exist.

"Phase II is designed to proceed concurrently with Phase I. It provides for detailed engineering studies to determine where capital savings could be accomplished by application of the most advanced forms of waste treatment, water reclamation and/or a combination of two or more disposal functions.

"As you know, significant economies have been shown to accrue from combining sewage treatment and refuse disposal. With this arrangement, raw sewage sludge is combined with ground refuse and composted aerobically to produce a soil conditioner.

"Other possibilities for combined treatment are the use of sewage effluent as feed materials for desalting plants; the use of highly treated sewage effluent in a sanitary flush system such as that which exists in Charlotte Amalie; the combined disposal of sewage sludge and refuse by incineration either with or without heat recovery and combined disposal of treated domestic sewage and treated industrial waste through a common ocean outfall.

"Recent studies have shown that sufficient heat value may be available in refuse to significantly reduce the fuel or steam cost associated with distillation of sea water.

"The detailed engineering studies in Phase II would also include the development of optimum designs for interceptors, lift stations and force mains.

"The advanced engineering of these designs is a combination of classical sewer design technology utilized to obtain the least cost design for any given set of conditions.

"Thus, designs for any given component would be made on the basis of the latest available information on growth patterns, water, disposal volumes, materials, construction and engineering costs, plus an adequate reserve for anticipated expansion.

"Phase III is the construction program of the facilities designed during Phase II. Phases II and III are designed to overlap extensively, since it would have been unwise to attempt to complete the overall system design based wholly on projected growth patterns.

"Facilities would be designed and constructed in an orderly fashion over an eight-to ten-year period to meet the needs of the rapidly growing population.

"The master plan is designed with built-in flexibility to adjust to patterns of growth which vary from those now predicted.

"The general approach of the master plan provides for sewage generated in individual homes, businesses and industries to be disposed on site via septic tanks or package sewage treatment plants or collected and transported to a central plant for treatment and disposal.

"Industry normally pretreats their specific trade wastes without reliance on municipal facilities.

"In the three cities of Charlotte Amalie, Frederiksted and Christiansted, central sewer systems now exist, but the sewage thus collected is not treated and is discharged raw into the harbors of the three cities.

"Outside of these urban areas, most sewage disposal is by septic tank or in recent housing developments, through package sewage treatment plants.

"In developing our master plan, natural drainage areas are utilized as the basis for most sewer district lines. Other considerations in the selection of the geographic boundaries of districts were population density and growth potential of each area, terrain characteristics which would either enhance or limit future development, land-use plans prepared by the Virgin Islands Planning Board and existing and potential industrial development.

"On these bases, the three islands were divided into 16 sewer districts, six on St. Thomas, eight on St. Croix and two on St. John. Also included in our plan was a feasible practical, and approved method of financing the entire project, including the use of available federal funds.

"This detailed Water Restoration Master Plan was presented in detail orally and in written form to various officials in the Virgin Islands government this past February.

"I want you, the officials and the people of the Virgin Islands, to know that as a local firm experienced and knowledgeable in the problem of water pollution in these islands, we are ready, able and willing to give of our experience and ideas in helping to provide a solution.

"Mr. Chairman, if it would be helpful, we would be delighted to make a full detailed presentation of our Water Restoration Master Plan to you and members of your staff.

"Now, if you have any questions, my staff and I, including Dr. Harding, will attempt to provide some answers."

MR. TRAINA: Thank you very much. As I understand it, the report and information contained in your statement is part of a report of Reynolds, Smith & Hills?

MR. MORAN: They are consulting engineers and worked with us in conjunction with this Water Restoration Master Plan. I have a copy of the report here.

Also, since the time that that report was printed, there have been certain amendments to it that can be easily included, especially in the financing area.

MR. TRAINA: For the record, are you going to submit this report?

MR. MORAN: Yes, I will give you a copy of it, and I will give you a copy of the updated one also, if you would like to have it.

MR. TRAINA: Fine. I have no specific questions -- perhaps one. In the plan you presented, what information was provided in terms of additional water supply for the island?

MR. MORAN: I am going to ask -- where is Dr. Harding? He was instrumental in putting this thing together, so I think he ought to be up here.

DR. HARDING: As of this summer, there will be, hopefully, nearly five million gallons of desalting per day of desalting capacity. We have proposed -- and I think it is entirely feasible -- that this amount, plus the rain-water catch that is practiced on the island, we believe would be probably adequate for the next two or three years.

This, then would give -- would permit the adequate development of sewage distillation procedures and equipment. We think that sewage distillation, or the use of sewage or desalting equipment, is probably the most feasible means of producing palatable water in the Virgin Islands in the next 20 years.

There are some technological problems associated with that, such as the handling of ammonia and volatile organic compounds. There are also problems associated with the selection of the most appropriate distillation procedures and the necessary building materials for the plants.

This, in substance, is the way we think this would be the most promising for development of adequate water supplies in that sewage would be collected in the urban areas, distillation plants would be there, and water would be reused.

There are several plants now which are either in operation or are in planning stages which are multiple-function plants. The oceanside incinerator, for example, on Long Island uses roughage as feed material for sea-water distillation.

They desalt on Long Island right now. This is sea water. An immense sewage treatment plant is now under consideration in New York City, which would use roughage to generate steam.

This would be sold for building heating in southern Manhattan. The makeup water for this sewage plant would be sewage effluent. All roughage disposal is, let's say, by land fill or surface disposal techniques.

DR. ANDUZE: Dr. Harding, can you tell me of any engineering firm or any community that desalinates sewage at the present time --

DR. HARDING: No, sir, none to my knowledge.

DR. ANDUZE: -- and renders a good effluent without desalinating it?

DR. HARDING: I was answering you in the terms of thermal distillation of sewage effluent, and there are none to my knowledge.

DR. ANDUZE: Is this mainly a part of this desalination project? In other words, would you have to go to the desalination process before you can reuse this water?

DR. HARDING: There is a well-documented case, and I believe it was in Kansas, during an intense drought in which a community took surface water from a river -- I could get you a reference on this -- and they recycled their sewage -- they recycled their sewage and treated it and used it for drinking water for several months.

DR. ANDUZE: Isn't there some difference between lake river and sea water, as far as the chemical content?

DR. HARDING: A very significant difference.

DR. ANDUZE: So would it be easier to reuse and treat lake water than salt water?

DR HARDING: That's right. What we are talking about is if you adopted this procedure, it might be possible to eliminate salt-water flushing --

DR. ANDUZE: In other words, you would recommend to the government of the Virgin Islands that they discontinue salt-water flushing?

DR. HARDING: Not until an adequate water supply is available.

DR. ANDUZE: Then you would recommend, as I understand it, an expandion of desalination process through the Virgin Islands --

DR. HARDING: Yes, sir.

DR. ANDUZE: -- and the use of potable water for both drinking and flushing as a means of firmly settling this problem of thermal pollution? Is that right? You're not touching the industrial waste problem?

DR. HARDING: No, sir.

DR. ANDUZE: You feel that the industrial waste problem would be taken care of by the industries concerned?

DR. HARDING: Yes.

DR. ANDUZE: Pretreatment?

DR. HARDING: Yes. It may be desirable, Dr. Anduze, considering the location of the industry in St. Croix, to consider combining disposal of outfall -- we now have an outfall under way in south Florida in which six communities have pooled together and done this.

DR. ANDUZE: Regarding this question of outfall, when you mention outfall, what treatment process do you take into consideration before this is dumped into the water?

DR HARDING: Primary treatment and chlorination.

DR. ANDUZE: Primary treatment consisting of water chemicals --

DR. HARDING: It consists of settling without the addition of chemicals and chlorination of the liquid affluent.

MR. TRAINA: Thank you very much, Doctor.

DR. HARDING: Thank you, sir.

MR. TRAINA: I understand Mr. Blake has arrived. Mr. Blake, do you have a statement for us? Our correspondence indicates that you did wish to present something.

Mr. Blake is director of the Virgin Islands Planning Board.

MR. THOMAS R. BLAKE: Mr. Chairman, Dr. Anduze, ladies and gentlemen: My name is Thomas R. Blake, planning director of the Virgin Islands Planning Board.

Mr. Chairman, I would prefer to forward to you a written statement later. I believe your invitation said that I would have 15 days after

this meeting to submit a written statement.

My reason for not being more prepared, in the past week, I, myself, have had to prepare testimony for several important matters here in the Virgin Islands, and we closed out a hearing before a committee of this legislature last night on historic preservation legislation, which, in a way, is somewhat related to the preservation and conservation effort we are trying to defend here, or take the position on, this morning.

I suspect that many people who will testify today will emphasize the pollution problems that are very obvious to us, resulting from the discharge of raw sewage into the coastal areas.

I believe that the Department of Interior is cognizant of the effort that the Virgin Islands government is making to reduce this problem and, hopefully, to completely eliminate it by beginning to implement a sewage collection and treatment system on all three islands.

Therefore, my remarks are going to be with regard to at least three other areas which I think are significant and probably not highly noticeable by very many people, but which also contribute to the loss of quality or the diminution of quality of our coastal waters.

My work in the Virgin Islands Planning Board is having to approve the subdivision of land. And islands, such as these, that are hilly, with the coastal areas being shallow -- that is, not extensive in depth before we reach the base of the hills -- has resulted, over the years, in serious erosion problems.

Now, you may wonder how does this affect the quality of the water, since the erosion is taking place on the hills. But many of you pass along Veterans Drive after a shower like this, and you will find that the water right along the coast is at least disturbing to look at, and certainly in the areas where there are bathing beaches, it is not desirable to bathe in.

Fortunately, the staff of the different agencies are constantly trying to keep up with the day-to-day problems to try to stay on top of the problems, or alongside of the problems; and we have not had the opportunity to be able to conduct the kind of research that is needed to give guidance to the developer himself; nor is the developer concerned about these problems, because all he is interested in is making the fast buck.

I suggest that the kind of assistance that the federal government might be able to give the government of the Virgin Islands may come from agencies, departments, such as the Department of Interior, the Department of the Army or the Corps of Engineers -- it may come from HUD, or it may come from the Department of Agriculture.

I recall about a year and a half ago the Corps of Engineers came to St. Thomas and St. Croix to take testimony on the water -- the soil erosion problems in the Virgin Islands.

To the best of my knowledge, this has not been pursued. To the best of my knowledge, there has been no result, and the problem continues to exist and our coastal waters continue to be polluted.

I attended a one-week-long seminar in Washington, D. C., sponsored by the Housing and Urban Development Department and the Department of Agriculture, which was concerned with soils in suburbia, and there seems to be a concern on the part of the federal government today to be able to preserve the elements that all make up our environment.

Another problem with which I am very familiar, because of my responsibility for examining places for dredging permits in the Virgin Islands, is that of pollution during the time of the dredging operation.

Now, let me explain to you what happens. Under the Submerged Land Act, the sand removed from the coastal area is the property of the United States government.

Permits to remove this material are obtained from the Department of the Interior and the Corps of Engineers. However, the application to do such work, to perform such work, is made to the government of the Virgin Islands, who sends the applications for review to the Director of the Planning Board and to the assistant commissioner of commerce for harbors.

In years past, the Office of Territories in the Department of Interior has raised several questions as to whether or not there is a disturbing or deleterious effect of these dredging operations to coastal areas that are concerned whether or not the dredging operation destroys marine life.

The questions raised were being put back to the local government to agencies which had the support for reviewing these applications.

Gentlemen, the Virgin Islands Planning Board is responsbile for long-range planning. It is responsible for administering the zoning and subdivision law.

It advises the government, and it has a limited staff. It is made up of people of architects, engineers, planners, sociologists, economists; but none of them, at the moment, are oceanographers.

Another problem which results from dredging operations is a disposal of spoil material. In most instances, the dredging operator is seeking commercial sand for the construction industry, but in other times, he is interested in either filling a marsh or inland pond or salt-water pond to create additional land area.

We know, in many instances, this minimizes the mosquito problem, and therefore is beneficial. At the same time, many of these areas to be filled are in areas known as wet lands or salt marshes behind mangroves in areas where there are coconut tress and farms, and immediately you can see the effect of the spoil on the vegetation.

I suggest that again the Department of Interior can give us assistance in this effort, and it is possible that the moneys derived, even though they are minimal, from the dredging operations -- I think the fee is something like ten cents a yard -- could be returned to the government of the Virgin Islands specifically earmarked for the purpose of research to determine what can be done about these things, because obviously, the construction boom is going to continue and the fine aggregate is going to be needed.

Because we are an economy which relies very heavily on tourism, and because our population is increasing, it is certainly to our benefit, from the public health standpoint, to eliminate the mosquito, and at the same time, we would like to preserve some of our natural beauty.

So again, I say I am pointing out the problems that everyone notices every day, and trying to suggest areas in which we might have some assistance.

The other areas which I would like to speak about has been mentioned by a previous speaker, and that has to do with roughage disposal.

Traditionally, we have disposed of refuse in the Virgin Islands in swampy areas near the coast line to create land fills, but eventually, the areas behind the mangroves become filled and we begin to push out beyond that, and you're only pushing refuse out further into the water, and the loose pieces begin to drift around, and with the currents here, they may start off on the north side of the island, west side of the island, anywhere on the island, and end up in our bathing areas.

Again, I suggest there are certainly more efficient systems of disposing of refuse today. Continued research is being conducted on being able to dispose of refuse in a much more satisfactory manner.

I say again that my testimony is directly concerned with seeking the ways, the kinds of assistance the federal government can assist a small community in answering some of the problems they are faced with every day.

I will submit a much longer written testimony covering all aspects of this to you, but I want to emphasize these points particularly for the benefit of the audience who may not begin to see these things every day of the week.

MR. TRAINA: Thank you, Mr. Blake, for a very good statement. I was most interested in your comments concerning dredging. At the other meetings, this has come up over and over again, and especially in regard to estuarine management.

At the federal level, our agency, the FWPCA, does review for the Corps of Engineers all applications for dredging. At the territorial level, do you participate with others, say, the water pollution control agency of the Island government here, in a review of this to determine the water pollution control aspect of such projects?

MR. BLAKE: In most instances I try to confer with Mr. Francois. Again, I say that it is not that we do not have a few people around who recognize the problem but the truth of the matter is, because of our other responsibilities, these things only get superficial attention.

This is where I think the research assistance is needed to be able to set some guidelines for us to follow.

MR. TRAINA: This is coming to our attention more and more as we conduct these meetings. Does your Board also review private dredging permits, industrial dredging permits, sand and gravel operations, the entire gamut of dredging?

MR. BLAKE: Yes.

DR. ANDUZE: Do you know of any incident where a dredging operation has temporarily displaced animal life, that this animal life did return after two or three years of dredging?

MR. BLAKE: I don't think I am qualified to answer that question, Dr. Anduze.

DR. ANDUZE: But you are aware of dredging?

MR. BLAKE: Yes.

DR. ANDUZE: And no one has ever reported to your office, two or three years after this dredging operation, that the animal life which was temporarily dislocated returned?

MR. BLAKE: We have had comments to this effect, but, again, the comments you receive seem to be subjective, with no basis and fact. There has been some concern recently of some proposal in the mangrove lagoon of St. Thomas, and the local government has gone to considerable time and effort to begin to survey the possibility of what would happen to marine life in that area.

At the moment, we don't have all of the results, but, I say again, I have not seen any of this. I know in the dredging operation that continues on an annual basis, primarily in St. Croix in the Christiansted Harbor where commercial operators have five-year permits for dredging for commercial sand, I don't know whether there was any fish life behind the reef to any extend, but if there was, there certainly isn't any more.

DR. ANDUZE: Since we are, in a way, sailing an uncharted sea, do you know if the government of the Virgin Islands has embarked on any research activity at the local level?

MR. BLAKE: The only work that I know of with regard to coastal waters on the effects of dredging is one ad hoc study by the Marine Biology Institute of Miami.

They studied two specific areas on St. Thomas, the Water Bay out in the east end and Brewer's Beach near Harry S. Truman Airport sometime last year.

For example, the government intended to dredge material from an area and deposit the spoil to create a new public beach on property that is controlled by the College of the Virgin Islands.

So we wanted some information about this. No case was given, in those reports, that there would be any effect on the marine life by those dredging operations.

DR. ANDUZE: But there has been some reserach effort on the part of the local government?

MR. BLAKE: One ad hoc study.

DR. ANDUZE: One?

MR. BLAKE: One.

MR. FRANCOIS: Last May, with the help of the Federal Water Pollution Control Administration, we were able to receive the services of two marine biologists who did a study of -- not a complete study, but a short study -- of the south shores of St. Croix, and they found for about 14 miles of coast line past the Harvey-Hess area that most of the marine life in that area had been killed by silt.

MR. TRAINA: Thank you. We will be looking forward to any other information which you would like to submit.

I understand Mr. Garfield has left. He is representing the American Institute of Architects. He has left a statement which will be put into the record.

Is Dr. Edward L. Towle here? Evidently he is not.

I understand Mr. John Erickson is here. Mr. Erickson is representing the Residents and Property Owners' Association of St. John.

MR. JOHN B. ERICKSON: Mr. Chairman, Dr. Anduze, ladies and gentlemen: My name is John Erickson. I speak for the Residents and Property Owners' Association of St. John.

I am no expert on pollution of estuarine waters. I am certain, however, that almost any industrial building in a coastal area alters the balance of nature and results in some pollution.

The real issue, therefore, is whether a new St. Thomas super jetport is necessary to the well-being of the Virgin Islands, worthy of risking just a little water pollution.

The prime argument in favor of a new jetport is, "We can't stop progress."

The Virgin Islands have been expanding economically at the rate of 35 per cent annually for the past 12 years. Is this not progress? Anywhere else in the world, it would be phenomenal, if not inflationary.

Is a greater rate of progress desirable? Yes, if progress means better schools, housing, hsopitals, roads -- plus cleaner beaches and return of the lobster and fish to our waters.

But if progress means more pollution, less fish, more traffic, and less service, it becomes questionable.

If one does not believe sheer numbers of people can hasten destruction of natural resources, look at the National Park Camp on St. John. Thousands on thousands come to the camp each year.

Park officials are worried about erosion of the Cinnamon Bay Beach. The tramp of feet 24 hours a day does not prevent erosion. More and more trees are cut down to provide more camp sites and roads for automobiles up to the camp sites.

Campers no longer walk. Park rangers are so busy policing and paper working camp problems they have limited time for protecting natural resources, designing trails, studying the water world, landscaping park grounds.

In truth, more and more visitors to the camp are less and less interested in the beauty of St. John than in having a low-cost resort, subsidized by the federal government, from which they can move out to where the action is.

Let us look for a moment at who would benefit from the impact of a 100-million-dollar airport on St. Thomas.

First would be alien workers, for thousands of aliens would be imported to do the construction work. Incidentally, the term "alien", although used by the U. S. government, is almost offensive.

Aliens are good workers, hard workers; but more aliens -- already one-third of the Virgin Islands labor force -- means extra expenditures

for housing, welfare, health, education -- to be paid for by the government, not an airport authority.

So the alien worker problem must be faced, unless the administration plans to reduce the ratio of one government worker for every two voters and release some Public Works Department employees for work with construction contractors.

The extra costs involved almost surely mean higher real property taxes. Income taxes are tied to federal rates. Excise taxes cannot go up much for fear of pricing the Islands' luxury goods out of the tourist market.

If local citizens want to pay increased property taxes to pay for the airport, that is their privilege; but they should know it is a probable consequence.

Secondly, of course, there is the business complex. Shops, banks, contractors, real estate promoters think they will benefit. Perhaps they will. Perhaps, too, the caliber of tourists coming to the Islands will change.

This is already happening at Cinnamon Bay Camp. Low-spending trippers are replacing discriminating campers. Businessmen may end up with higher gross sales and lower net profits.

As for the average Virgin Island citizen, he is already fully employed -- often more than fully -- such as the public works employee who drives a taxi after hours. This average citizen can't work more than so many hours a week.

I might cite other economic reasons for not building a new jetport in St. Thomas, but Mr. Isadore Palewonsky's admirable presentation is on the record.

In conclusion, I question whether increased dollar growth will benefit the Virgin Islands sufficiently to suffer just a little bit of pollution.

MR. TRAINA: Thank you very much, Mr. Erickson.

At this time, I would like to recognize Mr. Seton H. Thompson, who is Regional Director, Region Two of the Bureau of Commercial Fisheries. It's good to have you here.

For a change of pace, I would now like to call on Mrs. Ma'Carry W. Hull. I understand that you have a statement.

MRS. Ma'CARRY W. HULL: I do not have an affiliation. I am Ma'Carry W. Hull. I represent Mrs. Lucy Smith of Coral Bay, St. John. Mrs. Smith is the famous Mrs. Lucy who drives a taxicab and conducts tours.

She was unable to be here, and because what she had to say seems to me to be important, I urged her to let me write it down so I could read it for the record.

It reads as follows:

"People come to St. John because it is so beautiful and so peaceful. There aren't many places you find in any other part of the world so beautiful.

"That is the reason why we really want to keep St. John and the Virgin Islands clean and not spoil the beauty of the islands.

"Five years ago, Cruz Bay Harbor was so clean you could see the bottom and all the fish, et cetera. Now when you see the bottom, there are cans and broken bottles, and you can scarely see any fish.

"One reason is so many boats have faulty motors. There is oil waste. When there are more and more people, there will be more and more boats and more and more mess.

"The dump is ugly to look at. The burning and wet trash fill the lagoon with dirt. The smoke pollutes the air. It is unpleasant for the folks who live here, but they don't study it as much as the folks who come to visit.

"We have so much now, and we surely would like for them to see that we care for our little island, but we can't do it alone. There must be a way for everyone to understand how important it is to take care of what God gives us."

MR. TRAINA: Thank you.

DR. ANDUZE: Can you think of anywhere where the government of the Virgin Islands can prevent people coming to St. John who have a legitimate interest?

MRS. HULL: I don't think this is really what Mrs. Lucy had in mind. I just want --

DR. ANDUZE: I just wanted to get a clear viewpoint of the local government. When you mentioned beer cans thrown into the water -- is there any connection between the pollution of beer cans in the water and fish and animal life?

MRS. HULL: I would presume so. I'm not an authority.

DR. ANDUZE: I just don't want a layman to get the impression that beer cans deposited into the water, even though, from an

aesthetic viewpoint, it's not desirable, would in itself destroy the animal life.

MRS. HULL: I would presume that the chemicals, the breaking down of waste materials, would not be good for animal life.

DR. ANDUZE: But what about ships that sink in the sea that become a haven for fish?

MRS. HULL: I really can't answer that. I'm speaking only for Mrs. Lucy, who is a concerned citizen.

DR. ANDUZE: Well, citizens are concerned -- there are people who live on an island which is remote, and perhaps that is why they are trying to get to the moon to get away from the cluttering of earth, but on the other hand, we have to come up with some practical way of coping with things, and I'm trying to find out from you if you have any answers to problems which Mrs. Lucy poses there, because we are all sitting here in concert.

As a representative of the local government, I certainly appreciate your coming here and expressing Mrs. Lucy's sentiment, because quite a number of us share these sentiments.

But having our cake and eating it too has been a problem confronting mankind from the days of Moses. I mean, man is restless. But how do we contain the restlessness of man and contain some of the things which have become a custom?

I want to thank you.

MRS. HULL: I think this comes down to a basic matter of education, not only of children, but of the general public.

MR. TRAINA: Our study is somewhat limited. I don't know if we can get into all of that. Thank you, Mrs. Hull.

MR. RICHARD B. GRIFFIN: My name is Richard Griffin. I am the harbor master of St. Thomas and work for the local government.

In listening to this discussion, I think I see something that didn't really come out quite clear. I have been traveling through the islands for about ten years now, and I have observed as more and more visitors come to the islands, these people are throwing, as you mentioned, bear cans overboard.

They are dumping garbage right into each of these little harbors. I know exactly what you mean. You used to be able to go to Cruz Bay and the water was clear and you could see the bottom and it was beautiful.

But now when you go to Cruz Bay, you see beer cans, soda cans and garbage that has been thrown overboard. I also know how this happens. We see each night -- there are about 200 boats operating in these Islands that are charter boats.

Now, I know that these people don't store their garbage. I know when they anchor in these bays each night, and when it gets dark and when nobody can see what they are doing, they throw their garbage overboard.

I was out this past weekend and saw a beach that was littered with garbage, and there were a lot of boats visiting that particular bay. Going ashore, I found five or six sacks of garbage that had washed up on the beach, and this garbage was all from Puerto Rico.

It was fairly obvious. Now, is this what you were getting at?

MRS. HULL: I believe this is the kind of thing Mrs. Lucy was trying to make clear in her own little way.

MR. TRAINA: Of course, this is a problem that is not only apropos here to the Islands, but it is apropos wherever people are. While it obviously does have an effect on, in our particular cases, the estuaries and their economic value, I think it was indicated by the young lady that it is a question probably of education.

Maybe on a person-to-person basis this could be improved on. But I think this is going to be a problem -- perhaps all the research and investigation in the world is still not going to prevent anybody from throwing garbage overboard.

MR. GRIFFIN: I think we are going to have to have some kind of legislation to take care of this.

DR. ANDUZE: Are these charter boat people that visit these estuaries?

MR. GRIFFIN: Very definitely.

DR. ANDUZE: You know, there was testimony given in the meeting in St. Croix where the charter boat people were not concerned with their pollution, but they were concerned with the large ships.

In other words, these are two sources of pollution, the large commercial liner in the harbor plus the charter boat. You feel the charter boat people are also guilty of some type of pollution of the estuaries, is that your testimony?

MR. GRIFFIN: Very definitely.

DR. ANDUZE: And do you feel there is a need for legislation to control pollution caused by charter boats?

MR. GRIFFIN: Yes, although we do have an old law against this sort of thing. It's just a matter of how do you catch one of them. You will never actually see somebody throwing something overboard, but in the morning, you will find it all over the bottom of where people are.

Take Caneel Bay. You know how many people snorkel there. It's a beautiful place. But now you will see the place littered.

DR. ANDUZE: Do you know if the litter law applies to estuarine areas?

MR. GRIFFIN: No, sir, I don't know whether it does or not. But we do have a harbor regulation which applies to all the harbors that forbids you to throw things like this overboard.

DR. ANDUZE: But littering does not apply?

MR. GRIFFIN: I don't know whether it does or not.

MR. TRAINA: Thank you, again.

We next have Mr. Henri Blanc, who is the manager of the Virgin Isle Hilton.

MR. HENRI P. BLANC: Good morning. I am the manager of the Virgin Isle Hilton. I am not an engineer or a septic tank authority or anything like that, but just a consumer.

Dr. Anduze and I discussed this matter several weeks ago, and he felt it would be to the good concern of everyone if I represented the tourist industry who probably use the largest amount of fresh water here in the islands.

May we go off the record just a moment?

(Discussion off the record.)

MR. BLANC: The Virgin Isle Hilton is the largest single hotel between Puerto Rico and Trinidad. We have 211 rooms. We use three types of water basically.

We use ocean water in our flush system,and also we have the only salt-water pool in the island. This naturally saves a lot of water and gives us an advantage, we feel, because the salt-water pool has a lot of attractive uses.

We use rain water. We have a 100,000-gallon cistern, and we

catch rain water. We have no figure available as to how much rain water we catch or how much water we take out of the cistern, because it is not metered going in or going out.

But naturally, as you understand, a 100,000-gallon cistern is not very much, so we, therefore, use desalinated water or city water to top off the cistern and to take care of our requirements.

In 1967, the monthly average was 1,600,000 gallons, which cost us approximately $3200. The highest month was last July, when we used 2,250,000 gallons, for a cost of $4500.

The total for the year was 19,200,000 gallons of city water, which we purchased at a cost of $38,600. Last year, just the water we were able to meter and what we bought from the government, we averaged -- the average guest required 250 gallons a day to be served by our hotel.

Now, these services are very many, and I will list them as follows: First of all is personal use. I won't have to go too much further into that.

Secondly, hotel washing, dishwashing, glass washing, mopping, scrubbing of kitchen area, mopping of all the floors, and washing of windows, et cetera, in the hotel.

Third, laundry. We have our self-contained laundry, and we do all of our laundry, plus uniforms, plus guests' laundry.

Watering of gardens and lobby plants. When the rainfall is not sufficient, we have to water these plants, because we have expensive plants that must be watered with fresh water.

We also have plants inside which do not receive rain water and must be watered constantly.

We use steam -- live steam -- for cooking and cleaning. Therefore, we have a certain need of fresh water which we make into steam which we utilize for this purpose.

The sixth use of water for us is in our chilled water air-conditioning system, which naturally requires replenishment.

So these figures of millions of gallons of water are used for all of these six purposes. And as I said, each guest requires 250 gallons among all these different sources.

This is basically all I have, and I am happy to answer any questions.

MR. TRAINA: One of the real essential pieces of information we would like to get in these meetings is the economical value of

estuaries.

Now, as a person representing a group here that really participates in economic value, do you have any idea in terms of this island or based on some other criteria, what the economic value of having an area like this available for tourism is?

MR. BLANC: To the government, you mean?

MR. TRAINA: To the community, the private sector, the public sector.

MR. BLANC: Tourism is the single largest industry in the Virgin Islands and the single largest employer, after the government, and with the source of clean water, which is necessary in order to have tourism, this industry exists.

I don't know if I am answering your question, but what I'm pointing out basically is we need a good supply of clean drinking water for use of our guests.

As you can see from the figures here, this is based on 1967. Someone mentioned about the size of the island in the next five years, ten years and 20 years, which will naturally mean that these tourist industries will be swelled by that proportionate amount, which will mean that the water, the clean water, that we have available for our use, fresh water for drinking -- water is going to become a real problem.

Now, if the desalination plant gets its water from the harbor and from the ocean around us, and this water is soiled or unusable for transferring -- as I say, I am not an engineer.

I don't know if you can use this water or not, but as a layman, the further a water source is polluted, the harder you have to work to correct it or the more it is going to cost you to extract clean water out of it.

MR. TRAINER: Are there any public figures available on the dollar amount of tourism brought into the islands?

MR. BLANC: Well, these figures can be obtained from the Department of Commerce. I don't have those figures, but I could get them for you.

MR. TRAINA: Again, Mr. Blanc, thank you very much.

I understand Dr. Edward Towle has arrived. Dr. Towle is the director of the Caribbean Research Institute.

DR. EDWARD L. TOWLE: It is my intention to file a written statement at a later date.

MR. TRAINA: I might add, the record is open for 15 days.

DR. TOWLE: My remarks this morning will be very brief and directed to simply stressing one or two very significant points that I can do in a very short time.

The Caribbean Research Institute in a rather quiet way -- and I am a relatively new director of it, coming from the Smithsonian and from working in water pollution in the Great Lakes area -- has worked for about three years, since its establishment, in the general field of conservation.

In our work, we have had a thread running through our research projects which touches directly on the question of water quality. We have worked in sponsoring conservation conferences with the cooperation of the American Conservation Association, one aspect of which has been concern over water quality and another aspect of which has been concern over the cost and the methodology of water production in water-short islands, as most of the Caribbean islands are.

My remarks this morning consist first of stressing my pleasure in a sense in finding the Department of Interior moving in the direction of assisting the islands, and this is part of a larger general research program in doing the kind of in-depth study that you have to have done before really sophisticated planning and integrated planning can take place.

Now, these hearings, I hope, will bring out from all members -- all segments of the community -- a point which you made just a moment ago. That is, we need to demonstrate -- we must demonstrate-- that there is an economic need, that there is an economic density in a relationship between present growth rates and availability of what we call acceptable water.

Now, water that is acceptable to one industry, or one person, is not acceptable to another. You were mentioning a moment ago that the desalination process removes, in effect, by virtue of its heat, all contaminants.

This is quite true, and I concur. But at the same time, it changes the nature of some of the water that is put back, and we have something that, in other circles, we call thermal pollution.

It's a temperature increase in discharge which, in turn, affects the biological life, and we really don't know how much from the desalination plant itself.

My concern -- one of the concerns of the Institute has been with the question of stabilizing the quality of the beach areas, which is a combination of terrestrial problems and aquatic problems, and this is related to waste disposal, and it's related to a study of, and knowledge of, offshore or onshore currents which are affected by all kinds of things about which, in this case, in the islands we know very little about.

I have a lot of friends engaged in the study of Chesapeake Bay, and the Institute has a study that is being done in this estuary, and the complexity of the study and the volume, that is, the total expenditure, the number of participants -- you stand aghast at it when you look at the simplicity of the kind of thing that is going on here.

It is true it is a greater density population focusing around the Chesapeake Bay, but when you deal with land areas, and you look at a smaller area, you suddenly realize that an island is a very special area, because you don't have vast inner land that you can escape to.

You don't have great areas in which you can subdivide where you very quickly run out of things, one of which is water. You don't have great watersheds that you can dam, or alter or manage in a way that will give you good clean water.

Now, I think I'll leave you with this point, and that is that at the Institute, in the first place, there has not been at this point a broad enough research program.

We have, in effect, failed in that we have not generated, even in our own Institute, a sufficiently broad program of research that would give us some of the basis that we ought to have.

We are now going to go about a systematic attempt to guarantee that next year, and a year from then, and a decade later, that the hotels on these islands, and the people that live on these islands year around, and the people who use the islands, as yachtsmen, as swimmers, industries who use the islands, that they will all find an acceptable volume, quality and cost structure for this very primary and very basic input of water.

I think I will leave the rest of it for my written report.

MR. TRAINA: Thank you. Dr. Towle, if you don't mind, I have some questions. Could you describe briefly the nature of the Institute -- where it gets its support?

DR. TOWLE: The Institute is a two-year college which is presently engaged in becomming a four-year institution. It is in effect, but not legally, a land-grant college that is supported

primarily by the Virgin Islands Legislature with considerable input from federal sources, various federal programs like Title III and various educational programs.

The Institute itself is set up entirely on a self-funding project basis in that when we confront a problem, my job and the job of the Institute is to find a researcher and find a source of funds and put these two together.

MR. TRAINA: Is the Institute equipped to look into the economic values or --

DR. TOWLE: The Institute is designed to carry on research in both the natural sciences and the social sciences. My own field is in the social sciences, and happens to be in the history of science.

But we have done work in the field of vocational rehabilitation, in questions of the significance of submerged land and land fill in the Virgin Islands.

A list of publications of the Institute is available and I would be glad to send one to anybody that would like to have one.

MR. TRAINA: If you have such a list of publications, I would like to include it in the record.

DR. TOWLE: I have a copy with me, if anybody wants one.

DR. ANDUZE: Did I understand you to say, Doctor, that the use of this water that has been desalinated affects the estuarine streams?

DR. TOWLE: It is the effluent or the cooling water.

DR. ANDUZE: In other words, rain water that is used in the hotels for the Virgin Islands for washing dishes becomes effluent and ends up in the ocean and the sea here and affects the animal life in one way, but the desalinated water affects it in another way?

DR. TOWLE: You misunderstood me, or else I didn't make myself clear. I am referring to water that the plant itself uses as a cooling medium which it discharges back into the sea.

It is the same situation with an air-conditioned plant, with any thermal electric power plant.

DR. ANDUZE: Too hot water in the immediate vicinity of the plant?

DR. TOWLE: Let's say the temperature is 77, and you discharge it at 78 or even 88. Ten degrees difference can change the biological character quite a bit.

DR. ANDUZE: In other words, the waste water goes out three, four or five miles and possible affects the animal life?

DR. TOWLE: It is ridiculous to think that such a change could affect a swimmer or a yachtsman. This is very critical in areas where the city is transected by a river, because the usual process of industry and thermal power plants is to effectively contribute to a significant increase by each adding a little bit.

In the case of our desalination plant, it's a relatively minor contribution to the total amount of water available.

DR. ANDUZE: It is not an unmixed blessing.

DR. TOWLE: Nothing is.

MR. TRAINA: Thank you.

Mr. John Holter has indicated that he would like to make a statement. Mr. Holter is representing himself.

MR. JOHN W. HOLTER: Mr. Chairman, Dr. Anduze, ladies and gentlemen: It is a great pleasure to be here. I am not an expert in any of these things, but I still have a fairly decent sense of smell and sight.

I believe that clean drinking water and clean swimming water are very much related in many more ways than some people think on casual observation.

I think that perhaps the land silt washoff from rain water that does go down to the sea should be investigated a little bit further perhaps on further water catching devices.

They are not an aesthetic thing, but I think it is an important part of retaining water that is much more easily converted to drinking water than salt.

The fact of this silt -- it is quite obvious that silt does affect the close-shore marine life. The coral and the snailfish that we all love to see are seriously affected by this.

Another point that strikes me on all of this is the human element of throwing trash anywhere. I think that the people that come visit these beautiful islands are not particularly impressed with the roadside trash that is allowed to persist.

I do not believe that this is a natural thing. I think it can be legislated out, and when they sec this rather disturbing appearance on most of our access routes to all the islands, the spirit of trying to continue keeping the the waterways clear is also affected by this.

In other words, if they can throw the trash along the road and no one seems to bother -- well, you can put all the signs you want up, but this doesn't seem to solve the problem.

I don't know how many police are required to regulate this, but if the penalty were severe enough, perhaps we could do something about this. I definitely feel there should be more trash collection points -- baskets on the docks where all the boats could deposit their trash, and that all commercial and charter and pleasure boats required to have trash containers on their boats.

I think if they actually had them, they would use them. I have a boat of my own, and I refuse to let anybody throw anything overboard because of the container on the boat.

If I didn't have it, I know what would happen. It's so much easier to toss it over the side when no one is looking. It's just a human element. I think if it is easy for them to collect the trash wherever it may be, on the highways as well as on the boats, that all will collectively help clear up some of this situation.

As far as the sewage disposal business, I don't know anything about this sort of thing. In Cruz Bay, there is a little artificial bay there between the Park Service and the administrator's office there that is in a pretty despicable condition.

I think, if nothing else, at least a line, a plastic pipe out to the deeper water where the current could carry this away -- it's not an answer to the problem, but for the moment, it would help. Thank you very much.

MR. TRAINA: Thank you, Mr. Holter. This completes the list I have.

At this time, I would like to ask anyone else who hasn't been asked if they would like to make a statement.

Dr. Anduze, would you like to make a statement?

DR. ANDUZE: No, I have nothing else, except to say that on behalf of the governor of the Virgin Islands -- I know the governor would want me to thank all the people who testified and would want me to thank the Department of Interior for manifesting the in-depth interest that it has during the past few years.

I think it should be clearly borne in mind that the government of the Virgin Islands is excited in depth to the preservation of not only a

good water supply, but to the policing of the bays and streams.

I think the College of the Virgin Islands is one example of what is being done in order to encourage research. I think the Virgin Islands has placed an important part in the desalination of water.

Other than that, I have nothing more to say. The position of the government is available to anyone that may want a copy of it. I don't intend to stand up and read five pages, but I would like for your to know that your government is very much interested and very concerned, and we welcome your partnership and interest that the Department of Interior has taken in this matter.

MR. TRAINA: Again, I would like to mention that the transcript will be printed, and each of you registered will get a copy of it.

I also want to mention again that the record will be held open for 15 days to allow any of you or anyone else who would wish to submit anything they would like to.

On my behalf, on Mr. Thoman's behalf, I again want to thank you for coming. We appreciate the hospitality and the encouragement we have received here. We look forward to being back here again.

I know we can look forward to working both with Dr. Anduze and Mr. Francois in this program and in other programs. Thank you for coming.

The meeting is adjourned.

(Whereupon the meeting adjourned at 11:56 o'clock a.m.)

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NEPS Public Meeting
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SURVEY OF ILLEGAL DEPOSITS IN NAVIGABLE WATERS

PUERTO RICO AND THE VIRGIN ISLANDS OF THE U. S. A.

This survey has been conducted in accordance with instructions from the Chief, Operations Division, in letter, same subject, dated 21 March 1967.

The sources contacted for information are: Industrial Research Division of the Commonwealth of Puerto Rico Economic Development Administration; Aqueduct and Sewer Authority, Commonwealth of Puerto Rico; Environmental Sanitation, Water Pollution Control Division, Department of Health, Commonwealth of Puerto Rico; and the Commissioner of Public Works, Utilities and Sanitation Division; Bureau of Environmental Sanitation, Department of Health of the U. S. Virgin Islands Government. Copies of all reports furnished this office have been previously furnished F.W.P.C.A. regional office.

The Federal Navigation Projects in Puerto Rico and the Virgin Islands, which have been the subject of new work or maintenance dredging operations are San Juan, Ponce, Mayaguez, and Arecibo Harbors in Puerto Rico, and Christiansted Harbor, St. Croix, V. I. Other Federal projects are Guayanes and Fajardo Harbors in Puerto Rico, and St. Thomas Harbor in the Virgin Islands.

Industrial Plants

SAN JUAN HARBOR

Almost all the industrial plants considered in this survey are located in the vicinity of Bahia de Puerto Nuevo, San Juan Harbor, in the southern part of the harbor. These industrial plants are: P. R. Water Resources Steam Power Plant, the Porto Rico Cement Co., Inc., Puerto Rico Glass Corporation, P. R., Puerto Rico Container Co., Ltd., Molinos de Puerto Rico, Inc., Trigo Master Mix, Inc., Rice Growers Association of California (P.R.), Inc., and Empacadora del Caribe. These industrial establishments were visited and/or requested to submit a questionnaire with information on which to base our findings. The above-mentioned industries are what may be classed as dry plants, their discharge into navigable waters consisting of run-off water and sewage discharge for a rough estimate of 1000 persons. The sewage for all these installations is disposed of in Puerto Nuevo Bay after going through septic tanks. Of the above industrial plants the Puerto Rico Glass Corporation is the exception to the rule.

The Puerto Rico Glass Corporation is presently engaged in the manufacture of glass containers, with an annual production of 51,000 tons or 1,084,000 gross, and with an estimated waterborne waste of 50,000 g.p.d. A 30-inch drain discharges into a canal. The distance from the plant to the harbor is approximately one mile. The type of suspended solids are compounds of calcium, magnesium, silica, chromium, iron, and some organic matter from sand washing.

The Caribbean Gulf Refining Corporation discharges waste into the Malaria Control Channel, which in turn sends it into Bahia de San Juan, Bay View, Catano.

The following data is furnished in relation to this establishment:

a. Name of installation and ownership.

Caribbean Gulf Refining Corporation owned by Gulf Oil Corporation.

b. Products.

Motor gasoline, kerosene, diesel oil, LPG, and fuel oils.

c. Annual production.

13 million barrels petroleum products.

d. Number and size of sewers, drains, ditches, flumes, or other means of discharging waste into Malaria Control Channel.

One 48" diameter concrete pipe discharges water from refinery settling pond into open ditch that continues for approximately 2,300 feet to Malaria Control Channel.

e. Other methods of waste disposal.

Sanitary wastes are discharged into Municipal sewer system.

f. Estimated daily volume of waterborne wastes or process water.

500,000 gallons.

g. Distance from sewers to nearest improved navigation channel.

Approximately 2-1/2 miles.

h. Probable type of suspended solids.

Finely dispersed dirt and silica-alumina catalyst particles.

i. Probably associated constituents.

Carbonates and sulfates of sodium in solution.

The Bacardi Corporation is located near Punta Palo Seco bordering with Rio de Bayamon, Bahia de San Juan and State Highway no. 165. It is dedicated exclusively to the fermentation, distillation, aging and bottling of rum.

This year they are distilling some 6,500,000 P. G. of rum. Fermentation of the molasses necessary for the production and other industrial activities produces approximately 200,000 gallons of industrial slop every working day, which are estimated at 200 working days per year. The 6-inch slop line was constructed under permit SAKSP Pmts (83-67), and discharges approximately 100' bayward into Ensenada Boca Vieja. The slop does have a solid content of 8 to 9% which the Corporation claims to be soluble salts. It is my understanding that the effluent from a rum distillery contains 1% dead yeast, etc. and a large amount of activated carbon which gives it its black ink appearance.

In accordance with Pollution Survey of the San Juan Bay, FY 1965-66, prepared by the Puerto Rico Aqueduct and Sewer Authority for the Commonwealth of P. R., Environmental Sanitation, Water Pollution Control Division, Department of Health, the San Juan Harbor receives 21.4 m.g.d. of primary treated sewage from their Puerto Nuevo Sewage Treatment Plant, which serves about 70% of the metropolitan area of San Juan. During 1965 the effluent had an average B.O.D. of 121 mg/l for an efficiency of 35% with suspended solid removal of 66%. See attached San Juan Quadrangle for location of 72" outfall line.

Other sources of pollution mentioned in the report are:

a. Raw sewage discharge from Old San Juan.

b. Partially treated (septic tanks) domestic sewage from U. S. Naval Station.

c. Waste discharge from ships at anchorage and small vessels at the Club Nautico.

The 1963-64 report mentions the fact that a high organic load is being discharged into the harbor at the mouth of the Martin Pena Channel, and that it is the area in the harbor with lowest dissolved oxygen saturation value. The water in this channel is highly contaminated from the storm and sewer collecting culvert at Stop 20, the Corona Brewing Co., and the slums all along the banks of this channel. Quoting from the report: "The worst point in the bay in terms of sanitary significance is that near the mouth of the Martin Pena Channel. This is caused by high pollution reaching the bay through this point and the formation of sludge banks exerting benthal demand."

As a matter of general information, all maintenance dredging of the Martin Pena Channel, in the past, has been done by private interest.

72-m

PONCE HARBOR

The city of Ponce is the second largest city in Puerto Rico and it has two light industrial establishments located in the immediate vicinity of the harbor, which were investigated as possible contributing factors to the shoaling of the harbor:

1. National Packing Co., Playa de Ponce (Division of Ralston Purina Co. of St. Louis, Missouri).

   a. Products

      Canned Tuna (Chicken of the Sea and Van Camp Sea Food)

   b. Annual Production

      37,000 tons raw fish

   c. Number and size of sewers or drains discharging to navigable waters:

      1 - 6" and 1 - 30" line

   d. Estimated volume of waterborne wastes or process water.

      City water 1,083,000 gal. daily. Well water 1,050,000 gal for a period of 5 hours daily, 5 days a week.

   e. Number of employees.

      Average 800

   f. Distance from plant to Ponce bulkhead.

      300 feet.

   g. Bulk of waste is hauled to city dump.

   h. Probable type of suspended solids.

      Blood, scales, small pieces of tuna

   i. Probable constituents.

      Fish blood and detergent used in clean-up operations.

2. Ponce Tanning Corp.

   a. The name of installation is: Ponce Tanning Corp.
      It is an affiliate of Loenwengart and Co., Inc. of New York City.

   b. Products manufactured: Tanned leather

   c. Annual production: 7 to 8 million square feet of leather are tanned per year.

d. Number and size of sewer or drains discharging into waters:

Two 8-inch culverts

e. Estimated daily volume of waterborne waste consisting of clean-up water and process water: Approximately 70 thousand gallons.

f. Distance of sewerage nearest improved navigation channels:

1/2 mile

g. Method of waste disposal: Solid waste is trucked to the city dumps.

h. Probable type of suspended solids: animal matter

i. Probable associated constituents: Lime, approximately 45 pounds per day discharged.

j. Department of the Army permits in force for structures used for disposal of waterborne waste:

None

Sewerage System

The city of Ponce at present dumps all its raw sewage into the harbor by sewer outfalls 30" and 27", known as Los Pampanos and De Hostos, and are shown in Playa de Ponce and Punta Cuchara quadrangles attached. These outfalls do not have Department of the Army Permits.

The following is quoted from an undated report entitled Sanitary Survey of the Ponce Bay (1961?), by the Aqueduct and Sewer Authority:

"The sewage is discharged to the ocean without any treatment and with very little dilution. The wind prevailing during the day blows from the ocean, carrying the organic solids to the shore and rendering the place a real nuisance. So, it is obvious the need for a better and more efficient method of disposal. A flow of 1.296 million gallons during 16 hours was registered at the Pampanos system and 1.907 million gallons for the Hostos Avenue collecting system for the same time interval.

"Being 17,000 the number of residences served, and assuming five persons per residence, a total of 4.25 mgs. will result if 50 gallons of waste water per person is used. This is very close to the value of 4.043 mgd. found from flow measurements. The measured flow between the 0600 and 1600 hours was of 0.885 mgd. for the Pampanos and 1.244 for the Hostos Avenue system giving a total of 2.129 mgs. for both."

In accordance with a written communication received from the Director of Engineering, P. R. Aqueduct and Sewer Authority, a sewage treatment plant is under construction for the city of Ponce at Los Meros. Its location is about one mile west of Los Papanos 30-inch sewer outfall.

MAYAGUEZ HARBOR

The city of Mayaguez is the third largest city in Puerto Rico. Three canning plants were investigated as probable sources of illegal deposits. The plants are located adjacent to each other fronting the harbor. Their 30-inch outfall discharges into the ocean, approximately 1,600 ft. west of the Mayaguez harbor shipping terminal. The litoral drift along the shoreline is from west to east.

The following is information relative to the referenced plants obtained as a result of a visit and questionnaire submitted to them:

1. Star-Kist Caribe, Inc.

   a. Name of installation and ownership.

      (1) Star-Kist Caribe, Inc.
      (2) Star-Kist Foods, Inc. - Terminal Island, California

   b. Products

      (1) Canned Tuna Fish
      (2) Canned Tuna Cat Food
      (3) Fish Meal
      (4) Fish Oil

   c. Annual Production

      30,000 tons raw fish

   d. Number and size of sewers or drains discharging to navigable waters.

      (1) Front Drain - Starts at 18" diameter and discharges at 30" diameter.

      (2) Rear Drain - Starts at 18" diameter, continues to 24", and discharges at a 30" diameter.

      The 30" diameter drain is a common drain for Star-Kist, Del Monte, Ibec and Integrated Industries.

   e. Estimated daily volume of waterborne wastes or process water.

      (1) Front Drain - The entire discharge in this drain is salt water obtained from the ocean and from a deep well located close to the ocean.

(a) Compressor cooling water. This is clean water used for compressor cooling only. This water goes once through the condenser and is discharged back to the ocean. Approximately 1,000,000 gallons are used daily - 7 days per week.

(b) Fish thawing water - This is salt water used to thaw fish and then discharged to the ocean. An average daily usage for 5 days/week would be approximately 75,000 gallons. The actual daily usage can vary from 0 - 150,000 gallons daily depending on whether the fish is received thawed or frozen. This discharged water from thawing would contain a small amount of fish blood.

(2) Rear Drain.

(a) Retort Cooling - This is fresh clean water used only to cool the cans after retorting. An average of 350,000 gallons of retort cooling water will be discharged daily - 5 days/week.

(b) Packing room, Reduction plant, and Fish room clean up water. Approximately 150,000 gallons will be used daily - 5 days per week. Clean up water will contain some blood, small fish particles and detergents.

(c) Sewage disposal - All toilets, wash basins and showers discharge through a grinder and then to a cavitator sewage treatment plant. After treatment it then discharges into the rear drain. Approximately 4,000 gallons per working day are discharged from the cavitator to the rear drain.

f. The sewer discharge is approximately 3,750 feet from the main steamer channel to the Mayaguez pier.

g. Method of waste disposal.

Wastes discharging into the ocean are reduced to a minimum. All fish solid material not used for canning is utilized in the production of fish meal. The process liquids which are high in protein such as cooler water and stickwater are pumped to Integrated Industries and are used to make a liquid cattle food. A weir is installed in the main rear drain to stop any fish pieces or other material from going to the ocean. All waste material from the rest rooms is processed through a cavitator type sewage disposal system.

h. Probable type of suspended solid.

Small pieces of fish.

i. Probable associated constituents.

Fish blood, detergents used in clean up.

j. Department of the Army permits in force for structures used for disposal of waterborne waste.

Unknown.

2. Del Monte de Puerto Rico, Inc.

a. Name of installation and ownership.

Del Monte de Puerto Rico, Inc.
Subsidiary of California Packing Corp.

b. Products & Annual Production.

Tuna	1,000,000 cases
Pet Food	200,000 "
Tomato Sauce	300,000 "
Fruit nectars and juices	100,000 "
Fish Meal	1,200 tons
Fish Oil	35,000 gal.

d. Number and size of sewers or drains discharging to navigable waters.

One 30" Plant outfall

One 6" Sanitary line

e. Estimated daily volume of wastes or process water.

Salt Water - 900,000 gal.

Fresh Water - 200,000 gal.

f. Distance from sewers to nearest improved navigation channel.

Outfalls at pier front which is some 1,000 yards from charted navigation channel.

g. Method of waste disposal.

Cannery water untreated

Sanitary water - partial treatment.

h. Probable type of suspended solids.

Small fish particles and occasionally tomato seeds.

i. Probable associated constituents.

Fish blood and detergents.

j. Department of Army permits in force for structures used for disposal of waterborne waste.

None

3. IBEC Packing Company, Inc.

a. Name of installation and ownership.

Ibec Packing Company, Inc.

b. Products

Tuna canning

c. Annual Production

Approximately 12,000 tons processed per year.

d. Number and size of sewers or drains discharging to navigable waters.

Two drains discharging to navigable waters: one 4" drain and one 10" drain from plant.

e. Estimated daily volume of waterborne wastes or process water.

Approximately 200,000 gals. of process water daily.

f. Distance from sewers to nearest improved navigation channel.

Sea outlet is about 150 ft. from channel.

g. Method of waste disposal.

Waste disposal is accomplished by reduction plant where waste is converted to fish meal.

h. Probable type of suspended solids.

There are no suspended solids entering drains unless you consider fish blood from the butchering operation which is washed down during cleanup.

i. Probable associated constituents.

Same as above.

j. Department of the Army permits in force for structures used for disposal of waterborne waste.

A permit has been granted by the Army for the construction of a dock on the Mayaguez waterfront.

During my visit to Mayaguez I was advised by Ports Authority personnel stationed at the Mayaguez harbor shipping terminal that at times there had been considerable waste from the Del Monte tomato source plant disposed into the harbor; also, that the fishing schooners were in the habit of discharging clean out water and waste from the ship which creates a nuisance in the harbor. Del Monte of P. R.'s reply to this was that a month ago a plant malfunctioning caused the complaint; also that their boats were forbidden from pumping bilges or discharging garbage at their pier.

It is estimated that between 50 to 60,000 tons of raw fish are processed yearly in the Mayaguez canneries. In my opinion their waterborne waste containing particles of blood, small pieces of tuna, scales, and tomato seeds will eventually settle within the Mayaguez harbor Federal project.

The 1960 urban population of Mayaguez was 56,887 with their contributing sewage discharging into the harbor by means of a 48-inch diameter submarine line 926.59 meters long completed in 1961. (See Mayaguez quadrangle attached.)

During the year 1954 the Aqueduct and Sewer Authority made a series of field investigations and observations in order to determine the optimum location or point of no return of solids from a submarine sewage line. The result of the study by Authority's consultant engineer indicated that the line should extend bayward 1,050 lineal meters and that it should be constructed where it now exists. Soft sea bottom precluded carrying out the project as designed and the line was shortened to its existing length. The installation of the line was completed on 28 October 1961.

In 1963 the Aqueduct and Sewer Authority performed a sanitary survey of Mayaguez Bay. The conclusions of reference report follow:

1 - Mayaguez bay waters are highly polluted by the discharge of industrial and domestic wastes. This bay is at present one of the most polluted in Puerto Rico.

2 - Although the extension of the sewer outfall has helped to reduce the contamination of the bay waters, there is evidence that still the sewage discharges are a major contributor to the pollution of the bay.

3 - The extension of the sewer outfall eliminated the presence of sewage solids on the shore, but the dispersion of the bacteriological fraction is apparently not enough to assure good quality bay waters.

4 - The pollution of the bay has increased in certain areas due to the discharge of raw wastes by newly established industries.

5 - The Yaguez river is the major contributor of pollution to Mayaguez bay.

6 - Lack of circulation of rivers and streams emptying into the bay results in unsanitary conditions and health hazards.

7 - Pollution contributed by the sewage from the city of Mayaguez can be reduced by the extension of the submarine outfall to about 1,100 meters from the shoreline, as originally planned by the Aqueduct and Sewer Authority.

8 - Local business and individual homes located near the shoreline are also contributors to the pollution of the bay waters.

9 - Water pollution ordinances should be enforced to reduce the pollution of the bay waters.

ARECIBO BAY

Arecibo Bay is 40 miles by water west of San Juan. The bay has an open shape and is exposed to strong marine currents and heavy seas. The present population of Arecibo has been estimated at 65,000.

The only industry located within the bay is the Puerto Rico Distilling Co. Its location is at the westerly end of the city of Arecibo and 2 1/2 miles west of the Arecibo harbor, which is a man-made harbor near the mouth of Rio Grande de Arecibo. Fermentation of the molasses necessary for the production of industrial alcohol, rum, and pineapple wine produces 80,000 gal. of slop per day, which eventually finds its way into the city sanitary sewer system. 1,728,000 gallons of water per day are used for the factory cooling process which is also disposed in the same way as the slop. The typical distillery wastes are yeast, PO_4, SiO_2, $CaCO_3$, SO_4, Gyp, HCl.

The Cambalache Sugar Mill and the Puerto Rico International Paper Company Limited are located within 2 miles from the Arecibo Harbor proper. Their point of discharge into Rio de Arecibo is approximately 1 1/2 miles from the harbor.

The city of Arecibo does not have a sewage treatment plant. All raw sewage is disposed into the bay by means of a 24-inch and two 21-inch outfalls, as shown in Arecibo Quadrangle attached. Of the three outfalls only the 24-inch line has a Department of the Army permit.

(13)--

GUANICA BAY

The following is an excerpt from a pollution survey of Guanica Bay by the Division of Environmental Sanitation, Commonwealth of P. R. Department of Health:

The town of Guanica (population 13,767, census of 1960) is located north of the bay, its southern section extending to the waterfront.

There are three factories bordering the bay: The Caribe Nitrogen Corporation, South Puerto Rico Sugar Co., and Ochoa Fertilizer Co.

The discharge of wastes from the above-mentioned factories, especially the Caribe Nitrogen Co., has been the cause of frequent complaints from the residents of Guanica, mainly from the people living near the factory and fisherman from the area. Both the gaseous and the liquid wastes have been the cause of these complaints.

The following sources of pollution were located during the survey:

1. Caribe Nitrogen Corporation

This factory was established by January, 1957, southeast of the city of Guanica and at the eastern end of the bay. The manufacturing processes include the production of ammonium anhydride, sulfuric acid and ammonium sulfate.

Solid and liquid wastes are discharged directly to the bay thru a ditch. This discharge is continuous and represents the largest volume of wastes discharged into the bay.

Occasional discharges are also made through two pipes, one of which can be seen near the main discharge and the other submerged below the pumps that provide sea water to the factory.

2. Sugar Mill

This factory owned by the South Puerto Rico Sugar Co. was not in operation at the time of the survey. The effect of the industrial wastes on the bay could not therefore be determined. Nevertheless, a small discharge was located near Station #1, where the main discharge occurs when the mill is in operation. Discharges from septic tanks were also observed near Station #7.

3. Ochoa Fertilizer Co.

This factory uses ammonia bought from the Caribe Nitrogen Corporation for the manufacture of fertilizers. It has no discharge of liquid wastes into the bay.

4. Public Sewage Treatment Plant

According to records kept by the Aqueduct and Sewer Authority its efficiency is 80% in the removal of B.O.D. and 85% in suspended solids.

Other Sewage Discharges. A considerable number of private dwellings and restaurants are not yet connected to the public sewer system. Their domestic wastes discharge either directly to the bay or through a ditch that carries storm water and originates at the northern part of the city.

The biggest contributor to the pollution of Guanica Bay is the Caribe Nitrogen Corporation. In all samples taken from its main discharge a considerable quantity of black particulate matter was observed. This carbonaceous residue, product of the incomplete combustion of the petroleum used as fuel, rapidly settles to the bottom of the bay imparting to the bay waters near the discharge a black and filthy appearance.

VIRGIN ISLANDS

During the course of my investigations I visited the office of the Commissioner of Public Works of St. Thomas and discussed the subject of this survey with Mr. James W. Huston, Commissioner of Public Works, and his assistant, in charge of Utilities and Sanitation for the Virgin Islands, Mr. Rudolph B. Galiber.

The population of St. Thomas and St. Croix is 23,050 and 19,060, respectively, with 85% of the population of St. Thomas concentrated in the port city of Charlotte Amalie. The town has a collection intersecting sewage system and lift stations with an 18-inch outfall in Crown Bay. No sewage treatment facilities exist. In the opinion of the Commissioner of Public Works the Haulober Cut serves as a vacuum and carries away all the raw sewage out to the ocean through West Cregerie Channel. A significant source of pollution of the harbor are the tourist ships (310 in 1965) and all deep draft vessels visiting the harbor (942 in 1965).

The only industry in St. Thomas with waterborne waste disposal is the West Indies Distillers, information on which follows:

a. Name of installation and ownership.

West Indies Distillers

b. Products

Rum - Pott Rum

c. Annual production

400,000 proof gallons/year (160 days)

d. Number and size of sewers or drains discharging to navigable waters.

One, 22-inch

e. Estimated daily volume of waterborne wastes por process water.

340,000 gal/day - 160 days/year

f. Distance from sewers to nearest improved navigation channel.

300'

g. Method of waste disposal

Raw disposal - 30,000 ppm BOD

h. Probable type of suspended solids

Yeast, PO_4, SiO_2, $CaCO_3$, SO_4, Gypsum, H_2SO_4, HCl (typical distillery waste)

i. Probable associated constituents.

See above

j. Depa.tment of the Army permits in force for structures used for disposal of waterborne waste.

None

In St. Croix the same system of sewage disposal exists in the towns of Christiansted and Frederiksted as in St. Thomas; that is, sewage is collected and disposed raw into the ocean--in Christiansted through a 10 inch line which extends beyond Long Reef (SAJSP Pmts. 59-222), and in Frederiksted the sewage generated within the area is discharged into the Caribbean Sea through two 10-inch outfalls. This office has record of the Department of the Army Permit issued for only the Market St. Sewer Outfall (P.R. 238a).

In St. Croix there is a light industry named Diamond Distillery, Inc., which is located about 6,000 ft. west of the Alexander Hamilton Airport runway. This distillery discharges its effluent into the dry gut that goes through Enfield Green and eventually to the Caribbean Sea. These guts are normally dry and it is presumed that during heavy rains some of the slop is carried out to the ocean.

In connection with the other harbors of Puerto Rico and Virgin Islands information received from the Puerto Rico Development Administration is that there are no industries established near them except the Commonwealth Oil Refining Company, in Guayanilla Bay, Union Carbide Caribe, Inc., in Tallaboa Bay, and Phillips Puerto Rico Core, Inc., in Guayama, which is under construction and is building its own harbor in the vicinity of Jobos Harbor.

In St. Croix we have town heavy industries, which are the Harvey Alumina and the Hess Oil Company, which also have under construction their own harbor facilities. No permits have been issued to any of these heavy industries or to others established in Puerto Rico for the disposal of their waterborne waste.

Dr. J. G. Sandza, Consultant of Industrial Research Division of the Commonwealth of Puerto Rico Economic Development Administration is performing a survey of industrial plants along the coast and rivers of the Island. Dr. Sandza has agreed to incorporate a questionnaire similar to the one prepared by this office to obtain certain information from the local tuna fish industry. Copies of Dr. Sandza's report will be furnished your office upon completion.

CONCLUSIONS

a. In the opinion of the writer there are no significant amounts of illegal deposits from industrial complexes in Puerto Rico and the Virgin Islands of the United States of America, which may affect the navigable capacity of Federal navigable waters.

b. The pollution of all the Federally authorized harbors in Puerto Rico is extremely high.

Incls (under sep/cover)
Quadrangles:
San Juan
Playa de Ponce
Punta Cuchara
Mayaguez
Arecibo

L. C. MENDEZ
Area Engineer, San Juan Area
7 June 1967

83m

Statement on Pollution Problems, Virgin Islands

Introduction

Since its establishment in 1965, the Caribbean Research Institute*, as a segment of the College of the Virgin Islands, has devoted a significant portion of its resources and energies to various aspects of conservation problems in the Virgin Islands and in the eastern Caribbean. From the Caneel Bay conference on Caribbean Conservation, jointly sponsored by the American Conservation Association and the Institute, to a study of Barbados beaches, to studies in hydro-climatology, to a monograph on conservation progress in the eastern Caribbean which will appear this month, the Institute has consistently sought to develop in-depth studies which would contribute to a comprehensive program of environmental management, pollution control and resource conservation. It is, therefore, encouraging to find the Department of the Interior conducting these hearings on the optimum use and future development of estuarine and coastal resources of the Virgin Islands. My statement will consist largely of suggestions for research programs, for administrative modification, and for educational activities designed specifically to improve the levels of official competence and public awareness in matters relating to the protection, management, and development of the natural resources of the Virgin Islands.

II.

Present and previous contract research projects relating to hydro-climatology, commercial and sports fishing, lagoon and reef ecology, and submerged lands have all involved direct involvement with aspects of fresh and saline water conditions in the Virgin Islands. In each specific instance, basic data on water conditions, such as currents, sediment, trace elements, seasonal volumetric variations, pollutants, and temperature variations, was generally not available and ad hoc localized analysis proved necessary. Similarly, the biotic community present in various bays, lagoons, salt ponds, and littoral areas remains a relatively unstudied problem. What we lack, in effect, are the normal bench marks from which we can determine and measure change.

III.

Specific areas of research which warrant immediate attention include the following scientific studies.

A. Chemical analysis of seawater in inter-tidal areas using selected stations, periodic sampling and simultaneous micro-current and biotic community studies. Sampling and analysis would include tests for turbidity, hydro-carbons, detergents, pesticides, sewage, trace metals, chloride ion concentration, pH, and total conductance.

B. Salt pond/lagoon ecology and hydraulics.

1. Especially with reference to possible use as sewage lagoons (see HUD publication 302/2/1, January 1966 "Sewage Lagoons in Developing Countries").

2. Sanitary engineering aspects of using saline rather than fresh water in sewage lagoons.

C. Waste disposal methods, especially dumping and its impact on adjacent beach areas and biota.

D. Detailed study of the movements of the water prism from shoreline to continental shelf (or 100 fathom curve).

E. Harbor circulation and flushing problems in Charlotte Amalie, Jersey Bay, Cruz Bay, Magens Bay, and Coral Bay.

F. Engineering study of the Gerard-Worzel water production proposal.

G. Desalination plants and thermal pollution of inter-tidal areas and semi-enclosed bays, using Krum and Lindbergh Bays as comparative case studies.

IV.

Specific socio-economic studies should be undertaken to examine:

A. Economic significance of yachting to the Virgin Islands.

B. Political history of the Virgin Islands experiment in desalination.

C. Recreational use of water in the U.S. Virgin Islands (resident and visitor).

D. Beach sand removal and replacement and its overall impact to shoreline stability.

V.

The Institute views with approval the present efforts of the Government of the Virgin Islands to develop a more professional and more centralized and more effective program of conservation. Presumably a joint program of pollution abatement and anti-pollution legislation would ensue. But equivalent and simultaneous efforts at basic and applied water resources research relating to water, both saline and fresh, as they relate tothe total island ecosystem should receive particular attention.

VI.

Educational programs in natural resources management, conservation methods, and pollution abatement procedures should be implemented at the college level. Parallel educational efforts should be developed for the elementary and secondary school levels and broadly conceived programs of public education, designed to increase citizen awareness and perception of the essential aspects of conservation, pollution abatement and resource management, should be devised and scheduled in the community

Dr. Edward L. Towle
Director
Caribbean Research Institute
College of the Virgin Islands

* The Caribbean Research Institute, a division of the College of the Virgin Islands, was established to encourage research and its related activities for the Caribbean area and to provide a central research agency in the U.S. Virgin Islands, focussing on both the natural and social sciences as well as the humanities. Funded by private foundations, the Federal and local Virgin Islands governments, and the College of the Virgin Islands, the Institute has sponsored projects in the fields of Caribbean conservation, vocational rehabilitation, fisheries biology, insular ecology, urban planning, geography, and economic development.

May 2, 1968

STATEMENT OF JOHN A. HARMS

POLLUTION OF WATER IN THE VIRGIN ISLANDS

(In relation to marinas, pleasure boating, and sport fishing.)

I certainly do not believe that operations of this nature, present any threat to our local waters, as they may in some areas of the United States. The Virgin Islands are mountain peaks rising out of two oceans and with considerable currents around them. Most of our bays or estuaries have considerable circulation of water which causes them to be self cleaning.

I would say that the biggest problem we have with operations of this type, is trash and debris thrown overboard. All pleasure boatmen should be educated to use the trash receptacles in marinas and not throw trash and garbage overboard in anchorage areas or where it may drift up on the beaches. Also to use toliet facilities on shore while tied up in marinas.

From observation, fish life usually increases in dockage areas of small boats or pleasure craft.

It has always been my understanding that industry factories and unproper treatment of sewage of whole cities has caused us to become pollution conscience in the United States. I think that operations of this nature are what we should be the most concerned about.

John A. Harms

S/-

Fairleigh Dickinson University
Rutherford, New Jersey

PETER SAMMARTINO
CHANCELLOR

April 8, 1968

Mr. Frank J. Silva
Chief, Estuarine Studies
U.S. Department of the Interior
Southeast Water Laboratory
Athens, Georgia 30601

Dear Mr. Silva:

I regret that I cannot be present at your meeting in the Virgin Islands. However, I should like to make the following statement.

Many people think of the Virgin Islands and of the whole Caribbean area in terms of vacation. This is all to the good. However, of greater importance it seems to me is the value of the Virgin Islands as a place for oceanological advancement. As I said at the dedication of our Marine Biology Laboratory at St. Croix, the sea is man's last frontier, and St. Croix is particularly an outstanding location for the many different projects of research and to the intelligent use of the sea. As a matter of fact, I have just returned from California where the concept was brought forth of establishing at St. Croix a city in the sea - an underground station beneath the sea. You already have made some great steps forward. I believe that St. Croix would be an ideal place to find out how the sea can serve humanity.

Fairleigh Dickinson University stands ready to help in whatever way it can toward development in this direction.

Yours very truly,

Peter Sammartino

Peter Sammartino
Chancellor

SS

ST. THOMAS, U. S. V. I. P. O. BOX 1627

VIRGIN ISLANDS ASSOCIATION OF ARCHITECTS, ENGINEERS & LAND SURVEYORS

19 April 1968

Mr. John R. Thoman
Regional Director
United States Department of the Interior
Federal Water Pollution Control Administration
1421 Peachtree Street, N. E.
Atlanta, Ga.

Gentlemen:

This Association would like to establish our position on the problem of pollution: we are definitely against it.

We have been aware of many of the problems of pollution here, particularly sewage pollution. Our minutes record this concern and we have met with Mr. Francois and reviewed problems and solutions.

We understand that large programs are now under way to cope with peoblems of our urban areas. We hope these solutions come quickly. The problems in some areas, for instance Long Bay, are getting very serious.

We would like guide lines and technical assistance and information in order to be able to design properly for our clients. We suggest that the Planning Board be provided with really meaningful powers to enforce proper pollution control design particularly around beach areas.

The Association is ready to assist in any way it can.

Very truly yours,

John R. Garfield

JRG: rsw

John R. Garfield, A. I. A.
President

April 19, 1968

VIRGIN ISLANDS BEAUTIFICATION COUNCIL

STUDY

NATIONAL ESTUARINE POLLUTION STUDY

Decades ago, the English Poet, Oliver Goldsmith dr. ted a line for one of his better known poems that is not inappropriate to the intent and purposes of these hearings. "Ill fears the land," wrote Goldsmith in a mood of pessimism, "to hastening ills a prey." And as our present mechanized and urban society spreads with blind destructiveness across this and other caribbean islands, the human need for preserving contact, with open space, natural areas, with living, wild and growing things, with great forest and ocean beaches becomes more pervasive, more explicit, and unfortunately more expensive. As the pressures of people, roads, refuse, subdivisions increases, the aesthetic acceptability and liveability of the landscape is in danger.

We are confronted with a rapidly worsening problem of environmental contamination. Too often we hear the comment, "it's not my problem" when the sticky question of responsibility or remedial action is raised. Obviously, a massive educational effort in conservation procedures is in order. Water in its numerous forms constitutes a critical

problem on the entire island. We cannot begin to manage the environment without a thorough understanding of the water resources available. Where to plant and what to plant, where to build, how to dig, where to dredge, how much to grade, when to plant, each question has part of its answer rooted in the larger problem of water supply, volume, quality, location, and cost. For these reasons I would like to go on record as urging a greatly expanded effort to study, develop, protect and manage the water resources of the Virgin Islands. Particularly pertinent, would be the creation of the Governor's proposed Department of Conservation with broad regulartory powers and adequate funding. Similarly desirable would be an expanded funding of independent and in-house research in hydro-climatology harbor and littoral pollution, waste disposal waterfront renewal, beach preservation, erosion control, insular ecology, experimental agronomy and horticulture. Specifically, the pollution of the Harbor must be dealt with. I am aware that plans are underway to change the present sewerage disposal methods. This cannot be done fast enough.

We must learn one hard fact and learn it soon! Environmental management is a specialized skill which this locality must thoroughly master if we really want to keep the islands from becoming a cross between an urban ghetto and a town dump.

As we proceed to develop a Comprehensive Beautification Plan for the Virgin Islands, it has become increasingly obvious that as a prerequisite for the success of the plan, is an equivalent comprehensive understanding and development plan for the water resources of these islands. Such an approach is long overdue.

Joan Medlicott
Beautification Officer

Master Plan

This master plan for water quality restoration for the Virgin Islands is broad in scope and is of necessity limited in the detail of presentation since it is to serve as a planning guide for future development. This plan was developed from available information and reports, personal field investigations, conferences with various Virgin Island Governmental Agencies responsible for planning, construction, operation, and maintenance of public works, power, health and housing facilities, Virgin Island construction personnel and conferences with Federal officials.

The plan is divided into three phases. Phase I is designed to correct the most critical water pollution problems which now exist. It is anticipated that three to seven million dollars of capital expenditures will be required to handle adequately the most pressing problems in the islands. For budget purposes, we have selected the figure of five million dollars.

Phase II which will proceed concurrently with Phase I will incorporate detailed engineering studies to determine where capital savings can be accomplished by application of the most advanced forms of waste treatment, water reclamation and/or a combination of two or more disposal functions. Significant economies have been shown to accrue from combining sewage treatment and refuse disposal. With this arrangement, raw sewage sludge is combined with ground refuse and composted aerobically to produce a soil conditioner. Other possibilities for combined treatment are the use of sewage effluent as feed materials for desalting plants; the use of highly treated sewage effluent in a sanitary flush system such as that which exists in Charlotte Amalie; the combined disposal of sewage sludge and refuse by incineration either with or without heat recovery; and combined disposal of treated domestic sewage and treated industrial waste through a common ocean outfall. Recent studies have shown that sufficient heat value may be available in refuse to significantly reduce the fuel and/or steam cost associated with distillation of sea water.

The detailed engineering studies in Phase II would also include the development of optimum designs for interceptors, lift stations and force mains. The advanced engineering of these designs is a combination of classical sewer design technology with computers utilized to obtain the least cost design for any given set of conditions. Thus, designs for any given component will be made on the basis of the latest available information on growth patterns, water, disposal volumes, materials, construction and energy costs, plus an adequate reserve for anticipated expansion.

The unmatched beauty of the sea water, living reefs and sandy beaches of the Virgin Islands can be seriously impaired even with treated sewage and industrial wastes if the outfalls for these liquids are terminated at the bulkhead or in shallow water. Recent experience in similar waters on the lower East coast of Florida has shown the necessity for deep water disposal of sewage effluents to prevent the deterioration of the marine environment. For this reason, deep water ocean outfalls have been proposed for ultimate disposal of the effluents from each of the four proposed central plants.

Phase III will be the construction program of the facilities designed during phase II. Phases II and III will overlap extensively since it would be unwise to attempt to complete the overall system design based wholly on projected growth patterns. Facilities will be designed and constructed in an orderly fashion over an eight to ten year period to meet the needs of the rapidly growing population. The master plan must always contain enough built-in flexibility to adjust to patterns of growth which vary from those now predicted.

Upon completion of each construction program, the responsibility for startup, operation and maintenance of the facilities would be transferred to the operating division of Resources Development, Incorporated to insure continuous nuisance-free service to all the citizens being served.

General Approach. Sewage generated in individual homes, businesses and industries may be disposed of on site via septic tanks or package sewage treatment plants or may be collected and transported to a central plant for treatment and disposal. Industry normally pretreats their specific trade wastes without reliance on municipal facilities.

In the three cities of Charlotte Amalie, Frederiksted and Christiansted, central sewer systems now exist but the sewage thus collected is not treated and is discharged raw into the harbors of the three cities. Outside of these urban areas, most sewage disposal is by septic tank or in recent housing developments through package sewage treatment plants.

In developing this master plan, natural drainage areas were utilized as the basis for most sewer district lines. Other considerations in the selection of the geographic boundaries of districts were population density and growth potential of each area, terrain characteristics which would either enhance or limit future development, land use plans prepared by the Virgin Islands Planning Board and existing and potential industrial development. On these bases, the three islands have been broken into 16 sewer districts plus the National Park (which was excluded from consideration). Maps which show the boundaries of the districts are shown on the next page.

Next is presented a general description, by island and district, of the characteristics of the districts and the rationale used in selecting the level of service proposed for each.

Following this verbal description, vicinity maps with population densities and photographs which convey the terrain characteristics are presented in further support of the sewer district arrangement and type of services proposed. It should be noted that the entire area under the jurisdiction of the Virgin Islands Government has been considered in this master plan. No priority list is being presented at this time since selection of priority should be made only on the basis of detailed discussions with and on recommendation of the Government officials responsible for providing sanitary services.

St. Croix. St. Croix has been divided into eight basic natural drainage districts: Central St. Croix, Frederiksted, Oxford, Northside, Salt River, Christiansted, Northeast and Southeast.

The Central St. Croix District is the area of greatest growth: commercial, industrial, governmental and residential. A sanitary sewer collection system is proposed which will collect sewage from this district plus interceptors large enough to handle the sewage from the Frederiksted, Oxford and Salt River Districts with disposal through a central primary sewage treatment plant. The proposed plant site is east of the airport on government land next to the present industrial facilities of Harvey Aluminum and Hess Oil Company. An outfall system for both sewage treatment plant effluent and industrial waste to deep water south of the off-shore reef is proposed.

The Frederiksted District is one of the more populated districts of St. Croix. Collection of sewage is proposed with a pumping station and force main to convey the sewage to the Central St. Croix District. Frederiksted District will receive sewage in the future from the Oxford District and pump it to the Central District.

The Oxford District presently is not populated heavily. However, there is land suitable for development. As the development progresses, a central sewage collection system with pumping station and force main for delivery of the sewage to the Frederiksted District will be required. Since this sewage will be pumped twice, an aerated wet well may be required at the Frederiksted lift station to prevent any chance of an odor nuisance.

The Northside District is presently lightly developed and likely will remain so except for individual homes or commercial tourist development. This district will be served by individual septic tanks and package sewage treatment units.

The Salt River District is partially developed and shows indication of vigorous growth. A central sewage collection system is proposed for the area with a pumping station and force main for delivery of the sewage to the Central St. Croix District for treatment and disposal.

The Christiansted District is another presently populated area which will be provided with its own sewage collection and disposal system. Christiansted District will also treat and dispose of sewage from the Northeast and Southeast Districts. Complete treatment of the sewage will be provided with disposal of concentrated waste to deep water over the reef. Reuse of liquid effluent as feed stock to the desalination plant is a possibility. Treatment site is located on government land next to the desalination and power plants.

The Northeast and Southeast Districts are at present lightly developed and probably will remain so for the next ten to fifteen years. Individual residences will have their own septic tanks and drain fields. Commercial and tourist developments must be provided with or provide their own sewage treatment facilities. If municipal service is provided, sewage will be pumped to the Christiansted or the Central St. Croix area, depending on the particular location within the districts.

St. Thomas. St. Thomas has been divided into six basic natural drainage districts: Charlotte Amalie, Westend, Bordeaux, Northside, Eastend and Tutu.

The Charlotte Amalie District is the area in which most of the islands population, business, tourist industry, and existing sewer systems are found. A complete new major interceptor system is necessary along the waterfront. An outfall line to deep water is proposed in Phase I of the master plan. Treatment will be provided as required during Phase III. The degree of treatment and possible reuse of the effluent will be given more study during Phase II of the program to determine the best course to follow.

The Bordeaux District will be developed to medium or limited population density. Portions of the area will remain on individual septic tanks while the larger more densely populated areas will have sewers and treatment in package sewer treatment plants.

The Northside District will not be heavily populated. The larger club or tourist hotel complexes should be required to provide their own treatment through small package sewage treatment plants.

The Eastend District is populated now with isolated developments and could develop to overall medium density. Sewage collection is planned in this district with pumping facilities and force mains to convey the sewage to the Tutu area for treatment.

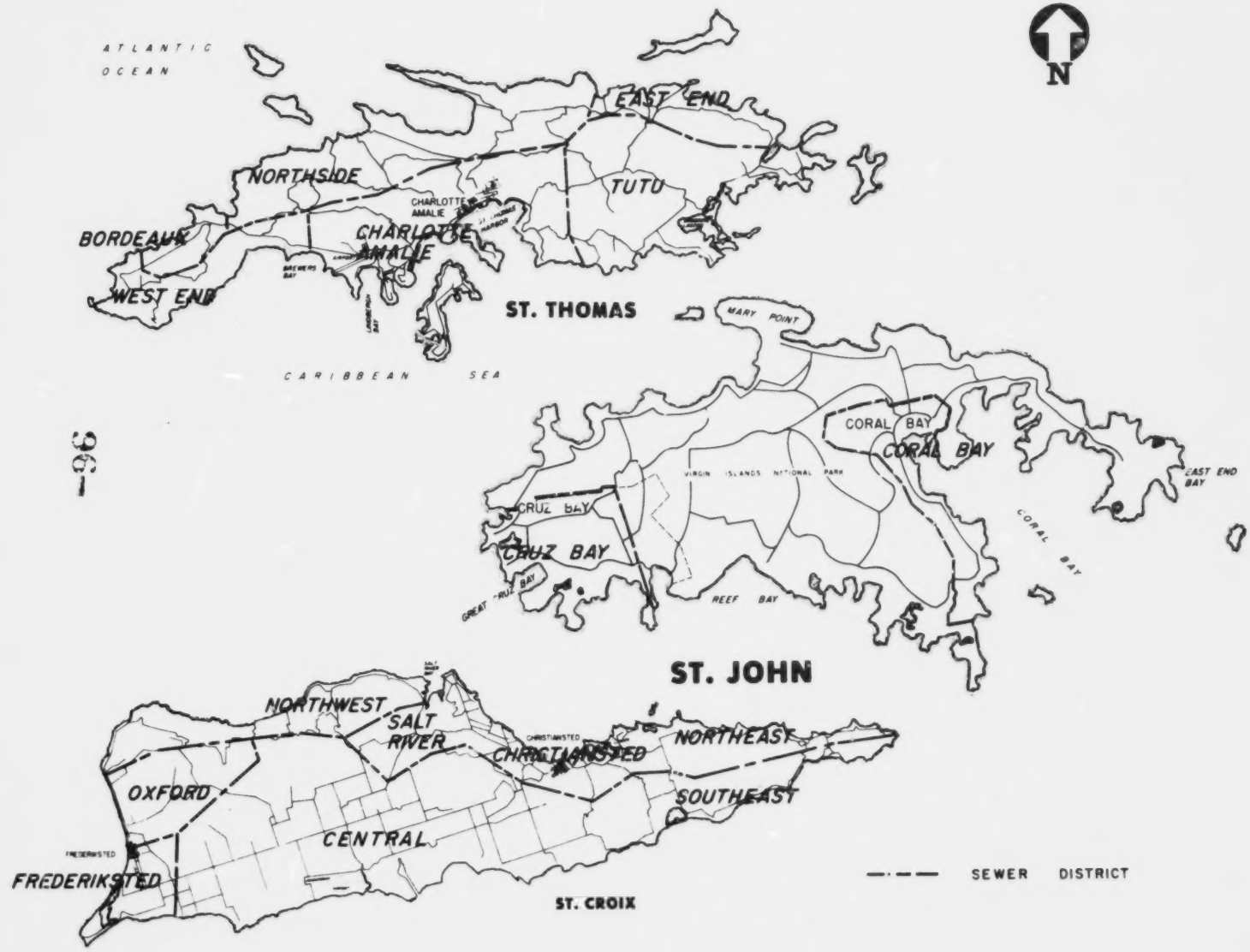
The Tutu District is in the process of widespread growth which should continue until a high population density has been attained. A central collection system will be provided for the area. Treatment through a primary sewage treatment plant with effluent disposal through an ocean outfall to deep water is proposed for the combined Eastend and Tutu Districts.

St. John. The island of St. John has been divided into three basic sewer districts: Cruz Bay, Coral Bay and National Park.

The National Park District covers most of the island land area and is under the jurisdiction, development and control of the Department of the Interior. If customary procedures are followed, the Federal Government will provide sanitary facilties for the Park area.

The Cruz Bay District is the area of present limited development. This area will be served by a small collection system and central package sewage treatment plant.

The Coral Bay District, as it develops, will be served by individual systems, either septic tanks and drain fields or small package sewer treatment plants. The selection will depend on the size of each development.


ATLANTIC OCEAN
N
EAST END
NORTHSIDE
TUTU
CHARLOTTE AMALIE
BORDEAUX
CHARLOTTE AMALIE
WEST END
ST. THOMAS
CARIBBEAN SEA
MARY POINT
CORAL BAY
CORAL BAY
EAST END BAY
VIRGIN ISLANDS NATIONAL PARK
CRUZ BAY
CRUZ BAY
CORAL BAY
GREAT CRUZ BAY
REEF BAY
ST. JOHN
NORTHWEST
SALT RIVER
CHRISTIANSTED
CHRISTIANSTED
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OXFORD
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CENTRAL
FREDERIKSTED
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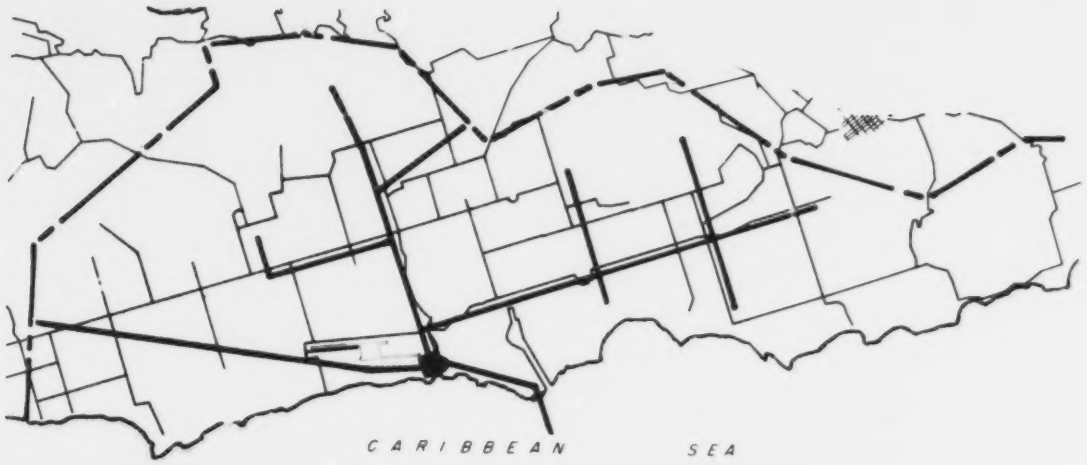
SEWER DISTRICT
ST. CROIX

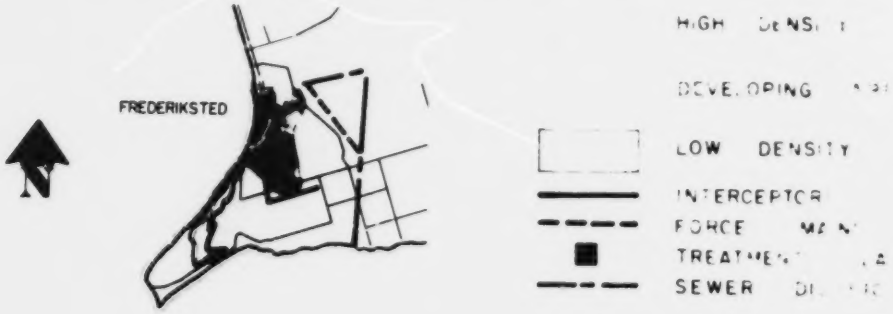


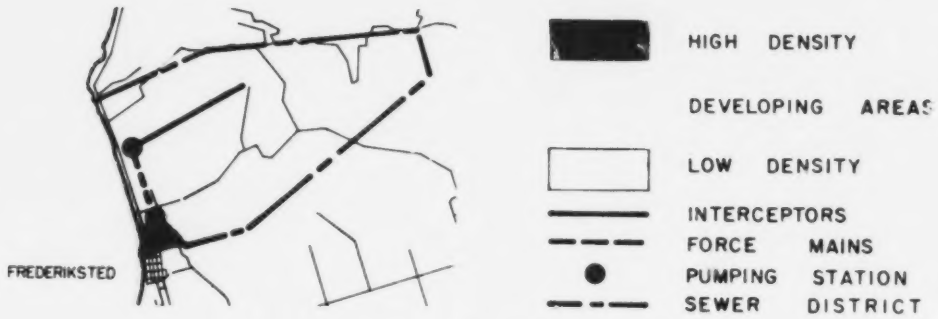
Central

Central St. Croix — This district encompasses the majority of the flat plains around the Harvey Aluminum and Hess Oil Plants and includes that area which has the greatest predicted population growth of the island (26,000 by 1980). It is to be served by a central treating plant with a combined industrial-municipal ocean outfall through the reef to deep water. A properly designed outfall will eliminate pollution to the beaches in this area.

Frederiksted

Frederiksted — This district consists of the present populated area of the City of Frederiksted. Population growth will be moderate (3,400 by 1980). It is to be served by interceptors and a force main to the central St. Croix treatment plant.



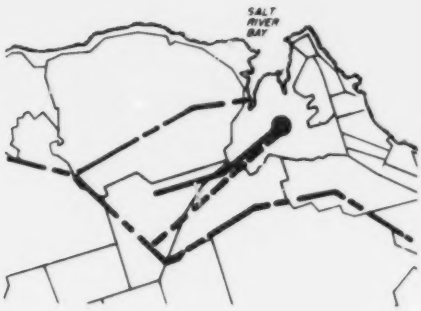


Oxford

Oxford — This district is sparsely settled, however, it has some developable land. It is to be served by an interceptor to Frederiksted as the area develops.

Northwest

Northwest — This district is comprised of the mountainous areas on the Northwest and North portions of the island extending to the present westerly boundaries of the Salt River basis. It is sparsely populated with little forecasting growth in the near future. It will be served by individual or small package sewage plants.



HIGH DENSITY

DEVELOPING AREAS

LOW DENSITY

INTERCEPTORS

FORCE MAINS

PUMPING STATION

TREATMENT PLANT

SEWER DISTRICT

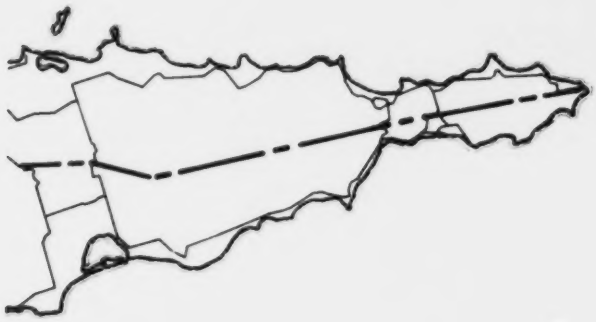
Salt River

Salt River — This district around Salt River Bay has some potential for growth. It is to be served by an interceptor and force main to the central St. Croix system.

Christiansted

Christiansted — This district comprises the present populated area of the City of Christiansted. It is to be served by interceptors, force mains and a central treating plant with ocean outfall to deep water.

N



LOW DENSITY

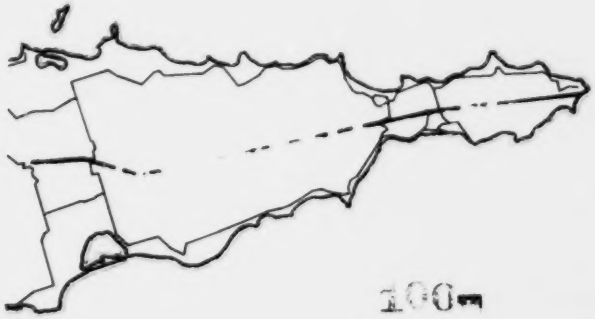
SEWER DISTRICT

Northeast

Northeast — This district is mountainous similar to the Northwest area. As in the case of the Northside area, it will be served by individual or small package treatment plants.

Southeast

Southeast — This district is sparsely settled and will be served either by package treatment plants or individual systems. It can also be combined to the central St. Croix system as the population grows.



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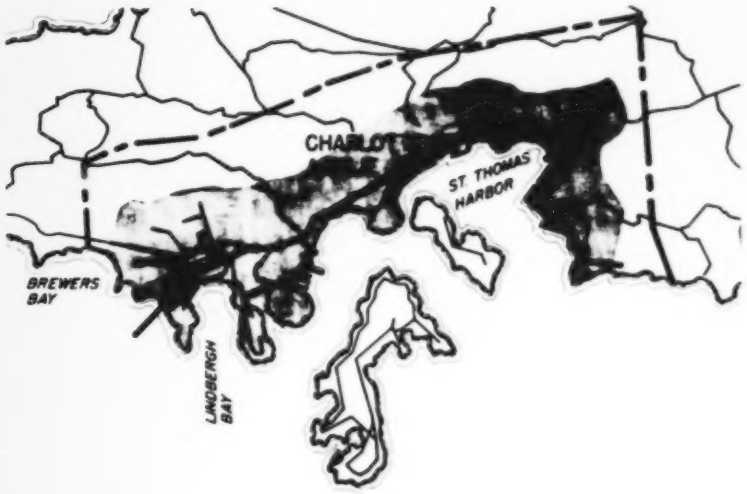
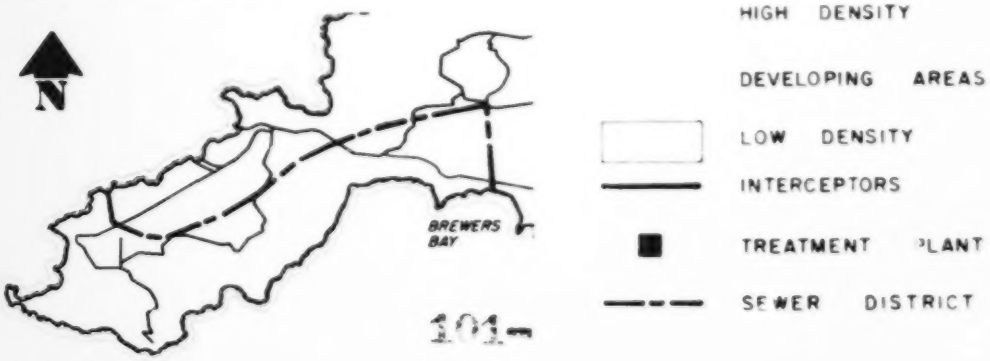


Charlotte Amalie

Charlotte Amalie — This district comprises the present City of Charlotte Amalie and surrounding area and extends west to include the site of the present airport. A population increase to approximately 28,000 by 1980 is expected. It will be served by a primary treatment plant and ocean outfall extending from a point of land between Lindburg Bay and Brewers Bay to deep water.

West End

Westend — This district consists of the southwest portion of St. Thomas. It is sparsely settled with little indication of population growth. Small individual or package plants will serve this area.



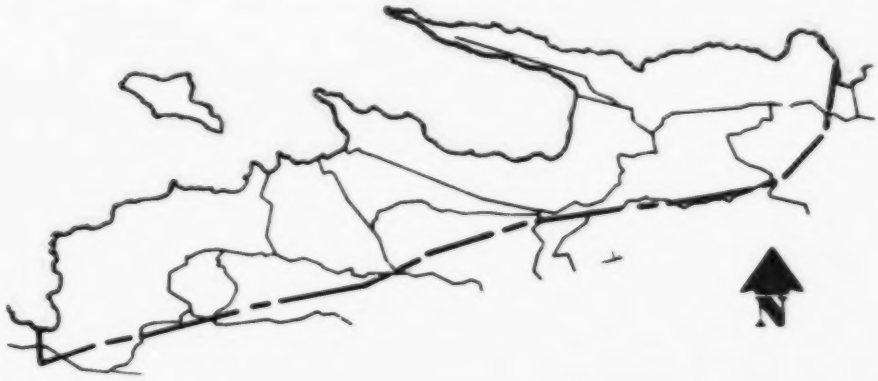
DEVELOPING AREAS
LOW DENSITY
INTERCEPTORS
TREATMENT PLANT
SEWER DISTRICT

Bordeaux

Bordeaux — This district borders on Bordeaux Bay. It is predicted the population growth of this area will be moderate in the near future. It is to be served by a small package treatment plant.

Northside

Northside — This district comprises the majority of the island from the Westend north of Charlotte Amalie to the Tutu and Eastend areas on the east. It is sparsely settled with little indication of population growth. There may be hotels or motels located in this area which would be served by small package treatment plants.

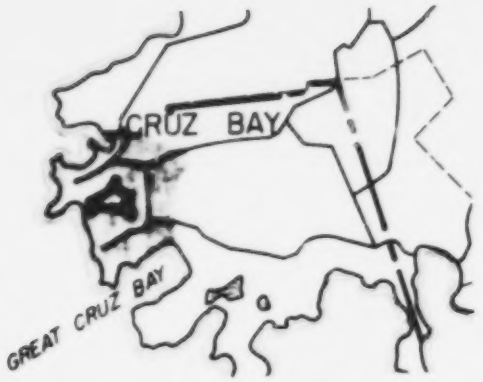


East End

Eastend — This district has moderate potential for population growth. Interceptors and a force main to the Mangrove Lagoon treating plant will serve this area.

Tutu

Tutu — This district has a large anticipated population growth (34,000 people by 1980). It is comprised of the majority of the east end of the island. It will be served by interceptors and a force main to a treatment plant located near the proposed airport near Mangrove Lagoon. An ocean outfall to deep water will prevent pollution being carried into Charlotte Amalie harbor.



HIGH DENSITY

LOW DENSITY

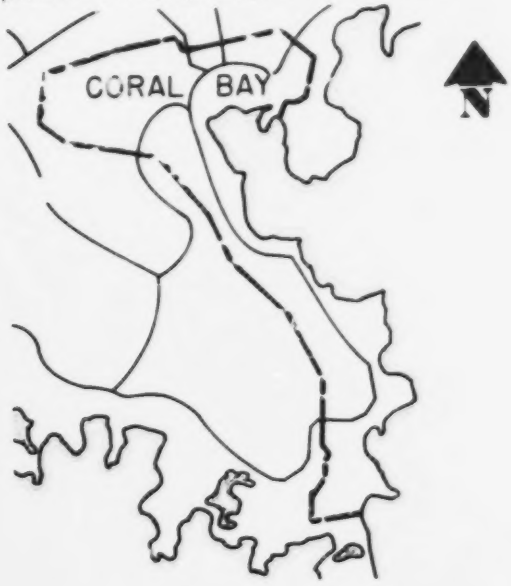
SEWER DISTRICT

Cruz Bay

Cruz Bay — The island of St. Johns has been divided into two drainage districts since the major portion of the island is a national park and under the jurisdiction of the Department of the Interior. The Cruz Bay area will be served by a package treatment plant.

Coral Bay

Coral Bay — The Coral Bay area, as it develops, will be served by individual plants or a small package treatment plant.



Sewage Treatment Plant Sites

Charlotte Amalie: *Top Left*
Site is Government-owned land with short outfall to deep water and with favorable ocean currents.

Tutu: *Top Right*
Site is Government-owned land in center of a drainage basin. Outfall will be run on land to minimize the subaqueous run to deep water.

Central St. Croix: *Bottom Left*
Site is Government-owned land in center of population area and adjacent to the industrial area. This will permit joint Governmental and industrial use of an outfall to deep water.

Christiansted: *Bottom Right*
Site is Government-owned land next to existing power and desalination plants to facilitate possible water reuse. Deep water may be reached by a short outfall.

Mr. Chairman, my name is Anthony Ayer of Frederiksted. I am a Realtor and have been a resident of St. Croix for approximately 18 years. I am speaking as First Vice President of the Frederiksted Civic Association and as a member of the St. Croix Chamber of Commerce.

The variable shoreline of these Virgin Islands can readily be divided into three categories. The first being rock coastline, sometimes falling several hundred feet directly into the sea. Over 40% of St. Croix's shoreline falls in this category, and the majority of it is neither accessible nor readily developable for recreation purposes.

The second category could be described as waterfront that can be developed such as swamps, lagoons, bays, and natural inlets. 40% of our coast line is in this category. In the coming years, these areas will be developed to provide the increased recreational and residential needs of our island. In some instances the extremely high cost of drainage, dredging, blasting or bulkheading will slow down the inevitable but only temporarily.

The third category consists of our natural and artificial harbors and beaches that already exist. This last group constitutes less than 20% of the existing shoreline but in terms of use by population, over 80% of all water-oriented activities, whether recreation, commerce, or industry takes place on or about this 20% of our shore.

In terms of pollution, we can ignore the first category of rocky coast line. It is not now polluted by natural process and is either unusable or inaccessible by man hence there is no artificial pollution to any great extent.

The second category of developable shoreline is already polluted by nature, or as I refer to it, the natural process of vegetative and animal decay. Artificial pollution by garbage dumps, private sewage fields, and wholesale raw human waste by Government disposal systems are rapidly increasin the pollution of these areas. By nature, these swamps, lagoons, and estuarys, contain porous sand and mud that absorb the waste materials. Also, in most of these swamps or bays there is little or no ocean current or tide to assist in the cleansing flow of sea water. The waste stays where it was left and rather than disappear will become greater as more vegetation dies and more artificial pollution is added.

The third category, that of developed coast such as beaches, and harbors, is rapidly being polluted by artificial means rather than, as in the previous case, by nature. Fortunately our beaches are still swimmable,

is directly west and over two miles away. I can only conclude that it originated at the "night soil" dump.

Pollution other than sewage is evident on our beaches primarily concentrated in proximity to both town harbors. This I understand is under direct jurisdiction of the Harbor Masters office and the U.S. Coast Guard. In addition to its being extremely hazardous to small craft, this pollution in terms of tin cans, wooden and cardboard cartons, lumber, etc. is unsightly, but relatively easy to prevent if the officials in authority would exercise their powers more diligently. This type of pollution is of great concern to all; however, it doesn't constitute the health hazard and permanent pollution damage that raw sewage will cause in destroying our beaches, tainting our waters, killing our fish and bird life and eventually chasing our tourists back to the States.

What then is the optimum use and future development of our coastal resources? Government, both local and federal will take part, as will private individuals, hotel interests, and industry. Existing beaches and commercial marine facilities will be in increasing demand. Larger piers must be built, existing facilities expanded and improved, more beach property made available to public use and in general more adequate administration and policing of the resources we now have.

Developers will probably, in the near future, begin reclaiming some of our swamp lands to provide additional residential communities. Hopefully such developments will provide beach facilities, marinas, and other related recreational activities for the public. In my experience, private projects of this sort are much more desirable and successfully constructed than government controlled developments primarily due to the red tape inherent in any governmental project. Care must be taken that adequate sewage disposal is planned for in these reclaimed areas.

Our local government has finally begun to face squarely the urgent problems inherent in disposal of human waste. Let us hope, with assistance from the Federal Government, that adequate sewage and garbage disposal systems will immediately be constructed to halt the tide. We cannot be content with a half adequate job. A complete sewage treatment plant with a network of pipelines throughout the island is the only answer. Small, individual treatment plants are not economically sound and extremely more difficult to administer if built by private individual developers. The reprocessed water from several large government plants could be reintroduced below ground and substantially raise our water table. Waste solids can be processed and cured for mineral content or fertilizer, but only if rigidly controlled by health

inspectors and chemists. This is then the role of the local and Federal Governments.

The private citizen, business man, developer, or industrialist has the task of developing additional coastal areas for commercial, industrial and primarily residential and recreational use.

Perhaps thought should be given to the preservation of some of our marsh lands as bird and fish breeding grounds. If so, the land should be acquired by a specific government agency designed solely for that purpose. Wildlife and marsh land refuges have well known and proven value for the public interest. I submit, however, that public or private park and recreational areas are of much greater importance on our small island where land is already at a premium than for marsh land refuges. Both public and private beach and recreational projects have their place in our society. Federal and local governments both must police and administer a certain number of such areas. Private developers must do the same, but both should immediately concern themselves with the cause and prevention of pollution so that adequate steps can be taken to halt further damage to the rare and beautiful resources we now possess.